

Wildland Fire Management Plan

Craters of the Moon National Monument, Idaho





Craters of the Moon
NATIONAL MONUMENT - IDAHO

Wildland Fire Management Plan

October 2000

Prepared and Recommended by:

John K. Apel
Integrated Resource Program Manager
Craters of the Moon National Monument

Date: _____

Approved:

James A. Morris
Superintendent
Craters of the Moon National Monument

Date: _____

List of Appendices.....	6
I. Introduction	7
A. Reasons for Developing This Plan	7
B. Resource Management Relationship	7
C. Compliance	7
D. Authorities for Implementing this Plan	7
II. Compliance with NPS Policy and Relation to Other Plans.....	8
A. NPS Management Policies Concerning Fire Management	8
B. Enabling Legislation and Purpose of Monument.....	8
C. General Management Plan Fire Objectives.....	9
D. Resource Management Plan Objectives.....	9
E. Fire Management Plan Description.....	10
III. Description of the Monument	10
IV. Historic Role of Fire	13
V. Goals and Objectives	15
VI. Wildland Fire Management Situation.....	17
A. Historic Weather Analysis.....	17
B. Fuel Characteristics	18
C. Fire Season.....	18
VII. Scope of Wildland Fire Management Program	18
A. Wildland Fire	18
1. Wildland Fire Suppression	19
2. Wildland Fire Use	19
3. Prescribed Fire.....	19
B. Fire Management Units (FMU).....	20
1. North End / Watershed Protection FMU (FMU1).....	22
2. Outstanding Natural Features and Interpretive FMU (FMU 2).....	25
3. Wilderness\Wildland Fire Use FMU (FMU 3).....	29
VII. Wildland Fire Management	32
A. General Management Considerations.....	32
1. General Management Plan (GMP) Review	32
2. Decision criteria checklist for a go/no go decision.....	33
B. Wildland Fire Use	33
1. Rationale for Fire Management Strategies	33
2. Objectives of Wildland Fire Use	33

3. General Plan for Wildland Fire Use	33
4. Staff responsibilities	34
5. Factors to be Monitored for Decision-Making	36
6. Relationship of WFU and Step-up Plan	37
7. Preplanned Implementation Procedures	37
8. Implementation Procedures not Preplanned	37
9. Cost Tracking	37
10. Outline for Project Records	37
11. Public Information on WFU	38
12. Potential Impacts of Plan Implementation.....	38
13. Exceeding existing WFIP - Selecting a New Strategy	39
C. Wildland Fire Suppression.....	39
1. Range of Potential Fire Behavior	39
2. Preparedness Actions	40
a) Prevention/Wildland Fire Use Educational Activities.....	40
b) Annual Training	40
c) Annual Preparedness Activities.....	41
d) Step-up Plan	42
Staffing Classes I and II (BI 0-40)	42
Staffing Class III (BI 41-60)	43
Staffing Classes IV and V (BI 60-120)	43
3. Pre-attack Plan.....	44
4. Initial Attack.....	44
5. Extended Attack and Large Fire Suppression	46
6. Minimum Impact Suppression Tactics	47
7. Rehabilitation	47
8. Records/Reports	47
Wildland Fire Implementation Plan (WFIP)	47
Individual Fire Reports (DI-1202)	47
Fire Experience and Qualifications	48
Daily Situation Reports	48
Smoke Management Reports.....	49
Report of Fire	49
Resource Order Form, NFES 1470	49
Year-end Accomplishment.....	49
IIIX. Prescribed Fire Management.....	49
IX. Fire Management Organization and Responsibilities	50
A. Organizational Structure of Park Fire Management Program	50
B. FIREPRO funding	50
C. Fire Management Organization in Relation to Park Organization	50
D. Superintendent's Responsibility for Periodic Assessment Signature.....	50
E. Interagency Coordination	50
F. Key Interagency Contacts.....	51
G. Fire Related Agreements.....	51
X. Fire Research.....	51
A. Previous and Ongoing Fire Research at CRMO	51
B. Fire Research Needs and Opportunities	51

XI. Monitoring	52
A. Monitoring Requirements	52
B. CRMO Fire Monitoring Plan	52
XII. Public Safety	53
A. Public Safety Issues	53
B. Procedures for Mitigating Safety Issues	53
XIII. Public Information and Education	54
A. Public Fire Information; Capabilities and Needs	54
B. Step-up Plan Information Actions	54
XIV. PROTECTION OF SENSITIVE RESOURCES	54
A. Cultural Resource Sites	54
B. Protection of Sensitive Natural Resources	55
C. Modern Infrastructure and Developments	55
XV. Air Quality/Smoke Management	56
A. Issues	56
B. Coordination with the State	57
C. Air Quality Management Objectives	57
XVI. Fire Critiques and Annual Plan Reviews	58
A. Critiques	58
B. Plan Reviews	58
XVII. Consultation and Coordination	59
A. Agencies consulted:	59
B. Persons consulted:	59
C. Plan Preparation	59

List of Appendices

- **Appendix A (References Cited)**
- **Appendix B (Contact List)**
- **Appendix C (NEPA Compliance - Environmental Assessment)**
- **Appendix D (NHPA Section 106 Compliance)**
- **Appendix E (Supplemental Information on Fuel Types)**
- **Appendix F (Descriptions of Vegetation Types)**
- **Appendix G (List of Plant Species Names Used in Text)**
- **Appendix H (Definitions)**
- **Appendix I (Wildland Fire Implementation Plan)**
- **Appendix J (Minimum Impact Suppression Techniques)**
- **Appendix K (Cooperative Agreements - NPS/BLM/Local)**
- **Appendix L (Limited Delegation of Authority)**
- **Appendix M (Fire Monitoring Plan - In Development)**
- **Appendix N (Vegetation Maps)**
- **Appendix O (GO/NO GO Decision Criteria)**
- **Appendix P (Firefighter's Pocket Card - Upper Snake River District Fuel Model T)**

I. Introduction

A. Reasons for Developing This Plan

This plan outlines in as detailed a manner as possible those actions that will be taken by Craters of the Moon National Monument in meeting the fire management goals for the area. This meets the requirement in Director's Order-18 (DO-18) that all park units with vegetation capable of sustaining fire develop a Fire Management Plan. Until a fire management plan is approved, parks must aggressively suppress all wildland fires, taking into account the resources to be protected and firefighter and public safety. Parks lacking an approved fire management plan may not use resource benefits as a primary consideration influencing selection of a suppression strategy, but they must consider the resource impacts of suppression alternatives in their decision. Development of an approved fire management plan will facilitate the goal of managing wildland fires in portions of Craters of the Moon National Monument for resource benefits. As a secondary benefit the plan is intended to reduce suppression costs without compromising public or firefighter safety.

B. Resource Management Relationship

The General Management Plan and the Natural Resources Component of the Resource Management Plan (RMP) for Craters of the Moon National Monument address the issue of fire management in a general manner. This specific action plan implements fire related management actions from the RMP.

C. Compliance

An environmental assessment serves as the NEPA documentation for this plan and is included as Appendix C. National Historical Preservation Act compliance is documented in appendix D.

D. Authorities for Implementing this Plan

Authority for carrying out a fire management program at Craters of the Moon National Monument originates with the Organic Act of the National Park System, August 25, 1916. This Act states that the primary goal of the National Park Service is to preserve and protect the natural and cultural resources found on lands under its management in such manner as will leave them unimpaired for future generations.

The Management Authorities (Directors Order-18, November 1998 and Reference Manual RM-18, February 1999) are the guiding documents for fire management plan implementation.

Servicewide fire management policy is expressed in the current revisions of the Directors Orders and attendant Reference Manual for the National Park Service, and "The Wildland and Prescribed Fire Management Policy: Implementation and

Reference Guide” (1998), and is incorporated herein by reference. The monument’s fire management objectives conform to the referenced documents.

II. Compliance with NPS Policy and Relation to Other Plans

A. NPS Management Policies Concerning Fire Management

It is the policy of the National Park Service to allow natural processes to occur to the extent practical while meeting park unit management objectives. NPS Management Policies (1988) state that "Fire is a powerful phenomenon with the potential to drastically alter the vegetative cover of any park. Fire may contribute to or hinder the achievement of park objectives. Park fire management programs will be designed around resource management objectives and the various management zones of the park". Specific guidance on wildland fire is contained in Directors Orders (DO-18) and attendant Reference Manual (RM-18) for the National Park Service, and "The Wildland and Prescribed Fire Management Policy: Implementation and Reference Guide" (1998).

B. Enabling Legislation and Purpose of Monument

1. Craters of the Moon National Monument was established in 1924 by Presidential Proclamation. Boundary adjustments were made in 1928, 1941 and 1962 by Presidential Proclamation and in 1996 by legislation. The presidential proclamations have been consistent in recognition of the area resources:

"...which contains a remarkable fissure eruption together with its associated volcanic cones, craters, rifts, lava flows, caves, natural bridges, and other phenomena characteristic of volcanic action which are of unusual scientific value and general interest; and ...this area contains many curious and unusual phenomena of great educational value and has a weird and scenic landscape peculiar to itself..." [Proclamation No. 1694 - May 2, 1924 - 43 Stat. 1947]

2. The NPS studied suitable areas for wilderness designation in the 1960's and recommended to Congress that 43,243 acres of the monument be designated as wilderness. The legislation passed Congress and the law designating the Craters of the Moon National Wilderness Area was signed in 1970. The wilderness area is managed in accord with the Wilderness Act of 1964 and suppression activities within wilderness are to be conducted in keeping with "minimum requirement" protocols identified in Director's Order #41, Wilderness Preservation and Management. The Wilderness Area is a mandatory "Class I" area under the Federal Clean Air Act. The Act created as

a national goal “the prevention of any future and the remedying of any existing impairment of visibility in mandatory class I Federal areas”.

C. General Management Plan Fire Objectives

The CRMO General Management Plan (1992) includes the following direction regarding fire management:

Page 10: “The present practice of suppressing all wildland fires in the monument presents problems because much of the monument is inaccessible. Fire suppression costs are high relative to the benefit, since there is very little to burn in most places and the policy of total suppression does not conform to the appropriate management response of the Bureau of Land Management (BLM) which manages adjacent lands.”

Page 24: “A coordinated fire management plan is also needed. Information from the rare plant survey can be used to identify rare plant locations that should be protected from fire and fire management planning can be carried out accordingly.”

Page 61: The following General Management Plan objectives are related to fire management:

“To perpetuate the natural ecosystems of the monument through active and effective resource management programs.”

“To preserve visibility and associated vistas and to prevent deterioration of the air-shed and all air quality related values.”

“To foster an understanding and appreciation of the environmental forces that formed the present day landscape of the Snake River Plain as well as an understanding of the plants and animals that have adapted to this harsh habitat.”

D. Resource Management Plan Objectives

National Park Service Management Policies (USDI 1988) define natural resource management as the concept of perpetuating a total natural environment or ecosystem, as compared with the protection of individual features or species. This concept is a distinguishing feature of the service’s management of natural lands. Accordingly, the primary goal outlined in the monument’s Resource Management Plan is the preservation of natural and cultural resources.

The Resource Management Plan objectives are to maintain or restore the natural resources of the monument, by allowing natural processes to operate unimpeded whenever feasible. This concept is not limited to impacts originating solely within the monument boundary. Both the monument’s Resource Management Plan and General Management Plan document the need for a Fire Management Plan which will emphasize the natural role of fire in the ecosystem. Once approved the Fire Management Plan will be considered a supplemental action plan in conjunction with the Resource

Management Plan. The Fire Management Plan will advance these objectives by allowing the fire to resume a role in determining the composition and development of vegetative communities within the monument.

E. Fire Management Plan Description

The Fire Management Plan (FMP) for Craters of the Moon National Monument is a detailed program of action to carry out fire management policies and objectives. Development of an approved fire management plan will facilitate the goal of managing wildland fires in portions of Craters of the Moon National Monument for resource benefits. As a secondary benefit the plan will reduce suppression costs without compromising public or firefighter safety.

III. Description of the Monument

- A.** Craters of the Moon National Monument is located on the northern edge of the semi-arid Snake River Plain in south-central Idaho. Established in 1924, the 53,440 acre monument protects a unique series of volcanic cinder cones, craters, lava flows, and caves located along the northern end of the Great Rift. The monument's north end extends into the foothills of the Pioneer Mountains. Elevations range from 5200 feet to 7730 feet. With the exception of the Pioneer Mountains, monument landforms resulted from a series of volcanic basalt eruptions which occurred over the past 15,000 years, with the most recent being about 2200 years ago (Kuntz et al. 1983).

Over half the monument consists of lava flows relatively barren of vegetation. Vegetated areas of the monument are dominated by sagebrush communities intermixed in areas with stands of limber pine. Douglas- fir and aspen occurs on the north-facing slopes of older cinder cones and in the Pioneer foothills. With the exception of the monument's "North End" (area north of Highway 93) and Little Prairie most continuously vegetated areas are only several hundred acres in size and are confined by lava flows lacking sufficient vegetation to carry a fire.

Aquatic resources are limited to two small perennial streams draining the Pioneer Mountains on the north end of the monument and year-round ice deposits in some lava tube caves and pit craters. Wildlife includes mule deer, elk, black bear, and moose; although the latter three species have generally been restricted to the Pioneer Mountains. A number of sagebrush obligate species (sage and Brewer's sparrows) are common within the monument, although sage grouse observations have been rare. Lava tube caves are used by a variety of bats, including the Townsend's big-eared bat, for hibernation and rearing of young.

Cultural resources are largely confined to surface or subsurface archeological sites. Only two 50+ year old structures remain within the monument and both are located within the area of the Visitor Center development complex. A section of the historic Oregon Trail's Goodale's Cutoff crosses the North End of the monument.

Developments within the monument are relatively limited; the Visitor Center complex (visitor center, maintenance shops, employee residences, and campground), a 5.6 mile scenic drive, and potable water system. The monument is transected by four miles of State Highway 93, 20/26 just north of the Visitor Center complex.

- B.** In terms of fire management the values to be protected include public safety, structures and other infrastructure, plant and animal communities, and air quality (particularly visibility) in the monument's Class I air-shed.

Craters of the Moon National Monument, Idaho

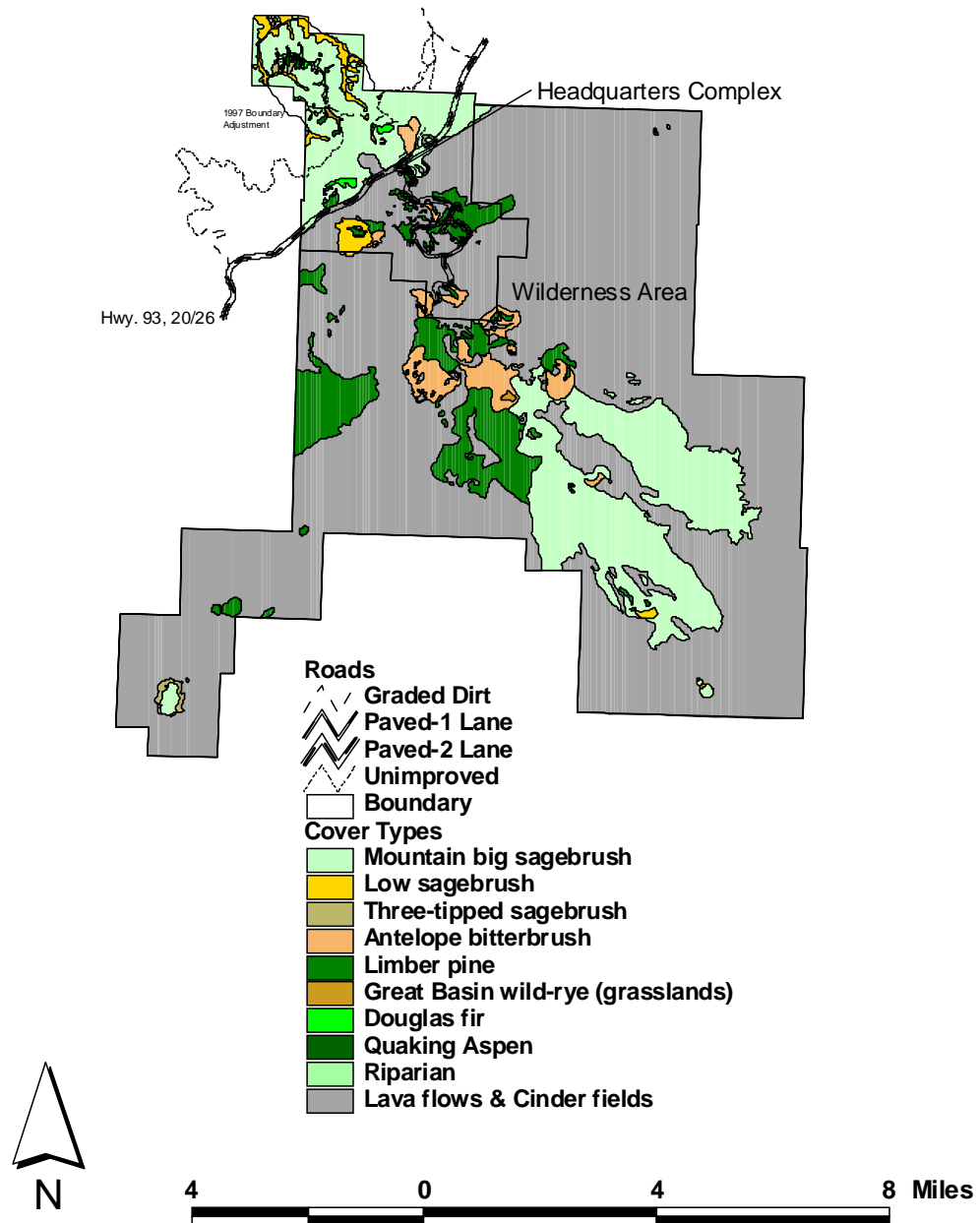


Figure 1. CRMO Cover Types

IV. Historic Role of Fire

The fire season at Craters of the Moon National Monument (CRMO) extends from mid-June through mid- September. Research indicates that vegetation similar to that on the monument has burned about every 25 to 75 years during pre-European conditions (Houston 1973, Wright and Bailey 1982). With the exception of areas in the northern portion of the monument, the vegetation is isolated into pockets by lava flows and cinder gardens. Fires burning in many of these small patches of vegetation would have little chance of spreading. The discontinuous fuels and low fuel loads on the monument have probably resulted in fire-free- intervals greater than those previously reported for similar vegetation types.

There are some relatively large areas of contiguous vegetation. One of these is the Little Prairie area located in the southeast corner of the monument. In 1992, a wildland fire burned 2000 acres of Little Prairie over a span of three days.

There is clear evidence of recent fires in the Split Butte area. Many charred limber pine boles can be observed in vegetation now dominated by sagebrush or grass vegetation. These burns appear to be somewhat older than those pre-1992 fires in Little Prairie. In the immediate area of Split Butte there is heavy herbaceous cover, mainly bluebunch wheatgrass and arrowleaf balsamroot. Both species which are good indicators of past fire occurrence.

Small areas around Two Point Butte and Fissure Butte also show a history of recent fire. These burns, however, were much more localized due to surrounding younger lava flows and cinder. Farther north around Crescent Butte, the evidence of fire is also common and there are numerous charred boles of limber pine. There is evidence of low intensity fires in this area as reflected in surviving fire-scarred plants.

The Big Cinder Butte area has also burned, within the last 100 years. Most of the recent fire evidence on Big Cinder Butte is confined to the southwest slopes. The area west of the Tree Molds parking area has also burned in the same time interval. Vegetation has been set back by fire and a community dominated by rubber rabbitbrush has replaced the big sagebrush vegetation. Some charred limber pine boles and sagebrush stems are present here. A fire boundary can be observed on the hillside southwest of the trailhead.

There is less evidence of fire between Big Cinder Butte and Park headquarters than in any other area on the monument. This is probably due to the small amount of vegetated area which is separated by recent lava flows and cinder gardens. If ignitions occurred, the area burned would have been small.

The plant communities north of the highway seem to be more influenced by fire than those to the south. All vegetation types in this area show evidence of burning, with the exception of the dwarf sagebrush types along ridgetops

which apparently seldom burn (Gipe 1976, Bunting et al. 1987). In most locations, these types offer excellent fuel breaks, not only because of reduced fuel, but also due to their location. In most cases, fires initiated on lower slopes would not burn through these areas. In most years, herbaceous production will be too low to allow the fire to spread across the ridgetop to the slope on the other side and back into a community with higher fuel loadings. The remaining vegetation types in the northern portion, such as Great Basin wildrye, aspen, Douglas-fir, and other sagebrush types, show evidence of past fire occurrence. In many locations, charred sagebrush stumps are still rooted in the soil. On some of the older burns in the southern parts of the monument, sagebrush stumps have been dislodged and are disintegrating, indicating older burns.

Most aspen types in the north end show evidence of past fire occurrence. This is indicated by even-aged stands (all trees seem to be the same size and age), charcoal remnants in understory, reduced down woody fuels, and in some areas an increase in snowbrush. Increment cores of aspen and cross sections of sagebrush were collected in the vicinity of the CRMO Research camp. These data indicate that most of the woody plants have become established in the last 25 to 30 years. The increase of aspen on the perimeter of the individual clones in this portion may be a cumulative result of the absence of fire and not the result of plants resprouting following the last fire.

Fire scars were dated on several Douglas-firs in Little Cottonwood Canyon using the increment core technique (Barrett and Arno 1988). Based on work done by Barrett and Arno fire has occurred every 30 to 35 years prior to Euro-American influence. Fire reedgrass, a species enhanced by fire, is common as an understory species in the aspen and Douglas-fir types. There is little recent fire evidence in this area. Fire may have been actively controlled by man during the period between Euro-American settlement and monument creation. Fires were more probably reduced inadvertently, however, by reduction of fine fuel loading by grazing livestock. The east facing slopes of Little Cottonwood Creek show much evidence of fire, indicating that the road and Little Cottonwood Creek might have served as fuel breaks.

In general, the influence of fire at CRMO is consistent with other areas of the Snake River Plain. The effect of fire can be observed in almost all vegetation types. Fire has influenced the establishment of introduced cheat grass (Bromus tectorum) in much of the central and western portions of the Snake River Plain. Cheat grass has replaced native shrub species following fire and resulted in the loss of significant sagebrush steppe habitat. In the higher elevation areas of the upper Snake River Plain cheat grass has proven less competitive. Cheat grass is found throughout the monument but is not found in dominant stands.

V. Goals and Objectives

Goal: Make firefighter and public safety the highest priority of every fire management activity.

Objective: Ensure all wildland fire operations sustain no injuries to members of the public or firefighters.

Strategies:

- All personnel involved in fire management operations will receive a safety briefing describing known hazards and mitigating actions, current fire season conditions and current and predicted fire weather and behavior.
- Fire management operations will be carried out by qualified individuals that promote the safe and skillful application of fire management strategies and techniques.
- Monument neighbors, monument visitors and the local residents will be notified of all planned and unplanned fire management activities that have the potential to impact them.
- All or portions of the Monument will be closed to the public when fire activity poses a threat to human safety (at the discretion of the Superintendent).

Goal: Manage wildland fires in concert with federal, state and local air quality regulations.

Objective: Ensure air quality thresholds for National Ambient Air Quality Standards are not exceeded in adjacent air-sheds (any area outside of the monument) due to fire use activities.

Strategies:

- Impacts to air quality will be considered as a part of the go/no go decision in the Wildland Fire Implementation Plan, Stage I, and periodic assessment throughout the duration of any wildland fire.
- Air quality impacts will be addressed as a part of the alternative development and selection in the Wildland Fire Situation Analysis.
- Smoke impact mitigation measures will be developed implemented for all wildland fire actions.

Goal: Suppress all wildfires (an unwanted wildland fire) to protect the public, check fire spread onto private property and protect the natural, cultural and historic resources of the monument.

Objective: Contain 95% of unwanted wildfires at less than 10 acres in size.

Strategies:

- Prioritize suppression actions on fires or portions of fires that threaten to damage public or private property.
- Ensure sufficient monument staff are trained in wildland fire operations.
- Ensure monument engine is in a state of readiness during fire season.
- Ensure monument staff responsible for fire operations understand fire policy.
- Ensure mutual aid agreements are current and operational.

Goal: Manage wildland fires so that Monument resources (natural, cultural, and improvements) are protected from damage by suppression actions and fire.

Objective: Manage suppression actions so that rehabilitation costs are less than 10% of suppression costs.

Strategies:

- Ensure wildland fire suppression operations employ Minimum Impact Suppression Tactics (MIST).
- Ensure fire operations personnel are briefed on Monument resources and potential damage from fire and suppression actions.
- Ensure a resource advisor is assigned to wildland fires within the monument.

Goal: Facilitate reciprocal fire management activities through the development and maintenance of cooperative agreements and working relationships with pertinent fire management entities.

Objective: Annually review and modify as necessary agreements with the four agencies listed below.

Strategies:

Coordinate with the following entities:

- BLM East Idaho and South Central Idaho Fire Dispatch
- Arco, Idaho Rural Fire Protection District

Goal: Use wildland fire where and when appropriate as a tool to meet resource management objectives within the Monument. Maintain or restore, where possible, the primary natural resources of the Monument, and those ecological conditions that would prevail were it not for the advent of modern civilization.

Objective: Have (on CRMO staff) or be able to obtain sufficient qualified personnel to manage at least 75% of qualified wildland fires for resource benefits.

Strategies:

- Restore fire as an ecological process in the fire use management unit.
- Monitor the effects of fire on the ecosystem.
- Cooperatively manage wildland fires across the mutual boundary with the Upper Snake River District, BLM, Great Rift Wilderness Study Area, when and where possible.
- Maintain a qualified Prescribed Fire Behavior Specialist (RXFS) and Prescribed Fire Behavior Monitor on CRMO staff.
- Ensure that a Prescribed Fire Behavior Analyst (RXFA) is available to respond within 12 hours of a fire.

Goal: Reduce wildland fire hazard around developed areas and adjacent to cultural and historic sites.

Objective: Ensure fire does not destroy any administrative structure, nor incur costly damage (rehabilitation costs greater than \$10,000) to any cultural or historic site.

Strategies:

- Apply mechanical hazard fuel reduction around suppression zones to reduce fire intensity and severity to lesser levels.
- Apply mechanical hazard fuel reduction around those cultural and historic sites vulnerable to fire damage.

VI. Wildland Fire Management Situation

A. Historic Weather Analysis

Craters of the Moon is located on the northern slope of the Snake River Plain. The area receives weather fronts from as far south as the Gulf of Mexico to Arctic fronts from the north; its primary weather pattern is to receive Pacific Ocean storms or high pressure systems that pass over the west coast between northern California and Washington. Annual precipitation averages 12" to 15", much of it from winter snow.

Summer weather is generally mild to hot and windy with clear skies except for occasional thunderstorms. Summer thunderstorms associated with "dry" lightning are common, with rainfall amounts ranging from heavy to non-existent. Spring can be dry and warm or cold and rainy, thunderstorms are rare. It can stay hot, dry, and windy, with occasional thunderstorm activity, well into September.

Craters of the Moon NM, Idaho (102260) Monthly Climate Summary Period of Record 12/1/1958 to 10/31/1999						
	May	June	July	August	Sept.	Oct.
Ave. Max. Temp. (F)	64.5	74.3	84.3	82.6	71.6	59.1
Ave. Min. Temp. (F)	36.8	44.5	51.8	50.1	40.9	31.3
Ave. Precipitation (in.)	1.76	1.3	0.70	0.87	0.89	0.87
Max. Temp. Extreme (F)	88	98	100	97	92	85
Min. Temp. Extreme (F)	15	25	30	30	16	2

B. Fuel Characteristics

Detailed description of fuel types found within the monument is contained in Appendix E.

C. Fire Season

Fire season is strongly dependent on seasonal variation with climate. The “normal fire season” at Craters of the Moon is based on cumulative fire and weather records. Generally speaking, fire season begins about May 15 and ends September 15.

The typical fire weather pattern doesn’t begin until June. The month of May can vary tremendously from wet and cold to warm, dry, and windy weather. June through August is generally sunny, windy, and dry with September being much like May. Snow has been recorded as late as early June and as early as the first week in September. Summer temperatures range from the 70’s to a maximum high of 95-100° with lows from the 30’s to 50’s. Isolated thunderstorm cells travel through rapidly bringing sometimes intense lightning activity associated with anywhere from zero rainfall to heavy, brief rains. Winds are commonly from the west or southwest with erratic changes during storm activity. Wind speed picks up with morning heat, commonly gusting 15-20 mph during the day, generally not slowing until early evening hours. High winds during storm activity of 30-40 mph are not uncommon.

VII. Scope of Wildland Fire Management Program

Wildland Fire Management Strategies to be Applied.

A. Wildland Fire

All wildland fires will have a Stage 1 Wildland Fire Implementation Plan (WFIP) completed in a timely manner. The WFIP Stage 1 serves as the

decision record for selection of the appropriate management response. All human-caused fires will be managed through a suppression response regardless of location.

1. Wildland Fire Suppression

All wildland fires in Fire Management Unit 1 will be suppressed using an appropriate management response. Management responses to specific wildland fires will be determined through evaluation of public and firefighter safety, fire behavior, values at risk, potential suppression damage, and availability of fire management resources. Management responses will vary from fire to fire and sometimes even along the perimeter of a fire. Appropriate management response options range from monitoring without on-the-ground suppression disturbance to intense suppression actions on all perimeters of the fire.

2. Wildland Fire Use

One of the strategies available to CRMO managers will be wildland fire managed for resource benefits (wildland fire use). This strategy may only be utilized in the Fire Management Units 2 and 3.

Wildland fire use is a strategy for allowing naturally ignited wildland fires, to burn as long as the fire meets pre-stated resource management objectives in the maximum manageable area (MMA) and prescriptive parameters are not exceeded. An ongoing or potential “wildland fire use” fire that does not meet predetermined prescriptive elements or fails to meet resource management objectives will be suppressed using an appropriate management response. Current policy allows management for resource benefits of portions of a fire perimeter, while other portions of the perimeter of the same fire are managed with an appropriate suppression response.

Managing wildland fires for resource benefits requires significant documentation to chronicle the decision process of agency administrators and fire managers. This documentation process is described in detail in [Wildland and Prescribed Fire Management Policy; Implementation Procedures Reference Guide](#).

3. Prescribed Fire

Currently the goals and objectives for the use of prescribed fire have not been sufficiently developed at Craters of the Moon National Monument to incorporate it into this FMP. This does not rule out further consideration of its application in future revisions of this plan.

Prescribed fire could potentially be used in support of ecosystem management to maintain and/or restore plant communities, cycle nutrients, reduce or remove exotic plants, and for a variety of other resource management objectives.

B. Fire Management Units (FMU)

The 1992 Craters of the Moon General Management Plan identified three management zones for the monument. Within those larger three zones there are sub-zones that more specifically define the management objectives of each area.

Natural Zone (53,309 acres or 98.9%)

Wilderness Subzone

Natural Environment Subzone

Outstanding Natural Features Subzone

Watershed Protection Subzone

Development Zone (142 acres or 1%)

Park Development Subzone

Interpretive Development Subzone

Special Use Zone (94.2 acres or 0.1%)

Based upon these management zones three fire management units are designated within CRMO. CRMO FMUs are differentiated by management objectives of the General Management Plan, boundaries and values-to-be-protected. The FMU are further sub-divided into 11 Fire Management Areas (FMA). The FMA are based upon fuel types and fire management characteristics.

Craters of the Moon National Monument Fire Management Units (FMU)

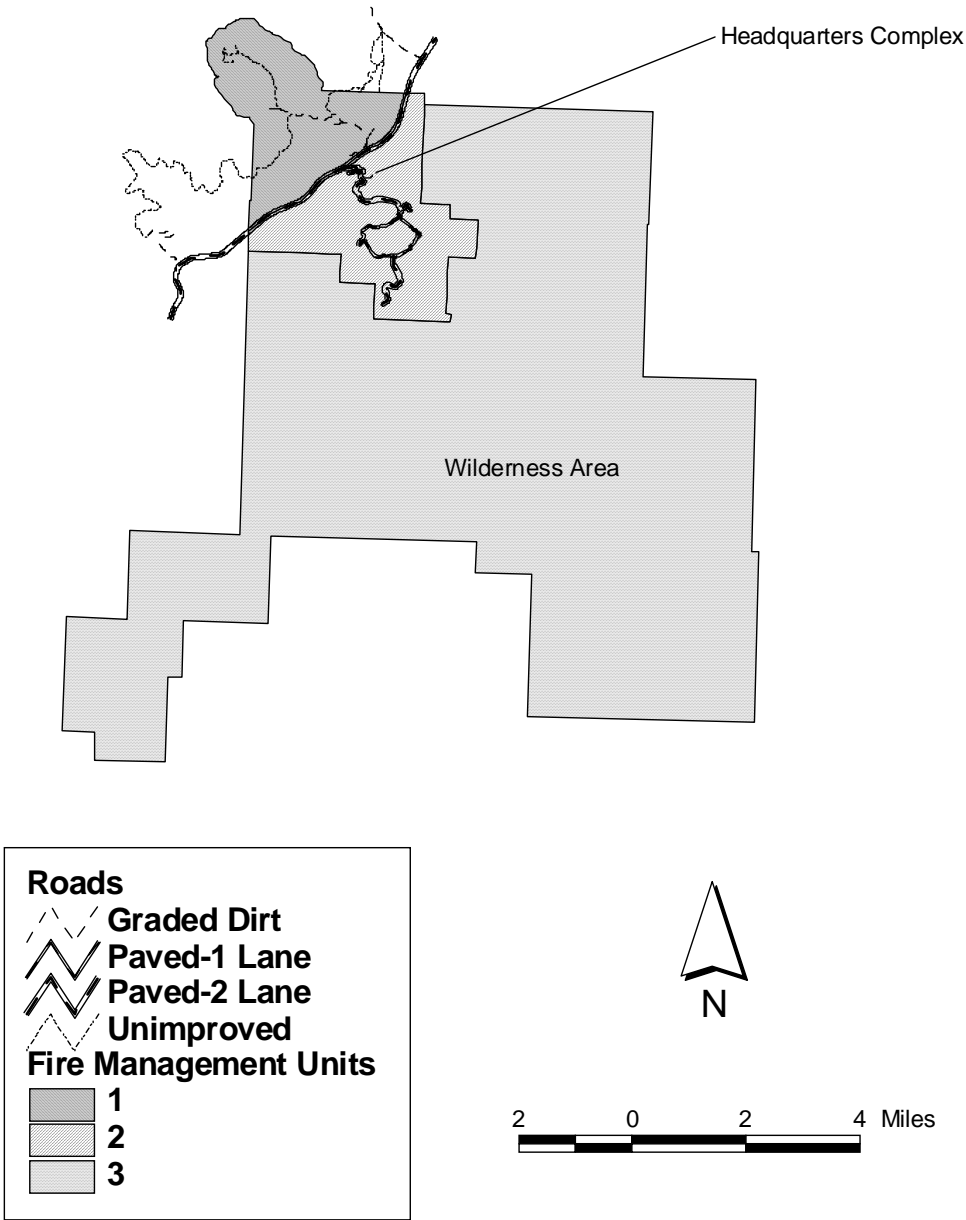


Figure 2.

1. North End / Watershed Protection FMU (FMU1)

a. North End / Watershed Protection FMU physical description

This FMU encompasses all areas of the monument north of State Highway 93,20/26 and includes the only surface water streams within the monument. Four of the perennial springs which feed these streams were developed in the 1930s to provide potable drinking water for the monument. Elevations within the unit range from just under 6000 feet along portions of the highway to 7,700 feet along the ridges in the foothills of the Pioneer Mountains. In addition to many of the vegetative communities found throughout the monument, the North End FMU also contains Douglas fir, aspen, and riparian forests.

The unit also includes lava flows with varied vegetative cover (primarily shrub species) as well as two major cinder cones. The monument boundary follows the watershed boundaries of Little Cottonwood and Leech Creeks. Highway 93 forms the southern boundary.

All areas within this FMU lie within one half mile of either Highway 93, Goodale's Cutoff, or the North End Road. The latter are single lane graded dirt roads. Facilities within this FMU include a group campsite, a research station, above and below ground electrical power lines, various structures (concrete valve boxes, treatment shed, and underground storage tank) associated with the water system.

All of this FMU is bordered by public lands administered by Upper Snake River District of the BLM. The east side by the Idaho Falls Field Office and the west side by the Shoshone Field Office.

b. North End / Watershed Protection FMU 1

Strategic Management Objectives

Within this FMU all wildland fires will be suppressed using an appropriate management response with the intent of minimizing loss of structures and property. The first priority during these suppression actions will be the safety of personnel and the public, including adjacent landowners.

Management of FMU 1 is designed to meet the following FMP objectives.

- 1) All fire management activities will have as the highest priority firefighter and public safety.
- 2) Appropriate management responses for all wildland fires (regardless of ignition source) will be rapid containment and suppression to

- protect the public, check fire spread onto adjacent public lands and protect the natural, cultural and historic resources of the monument.
- 3) Minimize loss of sagebrush steppe habitat important to sagebrush obligates such as sage grouse.
 - 4) Strong interagency fire and emergency services agency participation will be encouraged within this FMU. Interaction with adjacent land managers through CRMO participation in prevention programs will be encouraged.
 - 5) Watershed protection, particularly of areas upslope from drinking water sources in Little Cottonwood Creek.

c. North End / Watershed Protection - FMU 1 Management Constraints

- 1) Smoke management reporting procedures for burning in Idaho will be followed for all fire operations.
- 2) Employ minimum impact suppression tactics.
- 3) No off road vehicle use unless approved by the Superintendent.*
- 4) No dozer or grader use unless approved by the Superintendent.
- 5) Low level aircraft use and retardant must be approved by the Superintendent.*
- 6) All fire management activities will consider safety of personnel and the public as the highest priority.
- 7) Monument neighbors, park visitors and the local residents will be notified of all fire management activities that have the potential to impact them.
- 8) All park closures are at the discretion of the Superintendent.
- 9) No fire management operations will be initiated until all personnel involved receive a safety briefing describing known hazards and mitigating actions, current fire season conditions and current and predicted fire weather and behavior.
- 10.) Fire management operations will be carried out by qualified individuals that promote the safe and skillful application of fire management strategies and techniques.
- 11.) Smoke impacts to visibility along Highway 93 and resulting traffic safety concerns must be factored into selection of suppression tactics.

* Unless an emergency situation exists and waiting for approval would risk life or serious injury.

d. FMU 1 - Historic Role of Fire

This FMU does not allow for wildland fire use. However, evidence indicates large fires have occurred in the past. The quaking aspen stands are likely to have originated following wildfires.

e. FMU 1 - Wildland Fire Management Situation

1) Historical weather

The annual fire weather cycles are similar to that for the entire Monument. Higher elevation ridges and north facing aspects generally green-up slower in the spring and dry out later in the summer. The Little Cottonwood and Leech Creek areas are subject to up-slope daytime winds and down-slope winds in the evening. Generally the fire season extends from May to October.

2) Fuel characteristics and Fire behavior

This FMU is dominated by Mountain big sagebrush and low sagebrush types. Low sagebrush is located primarily along the upper ridges of the Pioneers. This FMU includes nearly all of the dense stands of timber found within the monument. These Douglas fir and aspen stands are limited to north facing slopes of cinder cones and the drainage's of Little Cottonwood and Leech Creeks.

3) Control problems

The North End is the only FMU with a high potential for fire to spread beyond the monument boundary. The steep slopes of the Pioneer Mountains are conducive to rapid fire spread upslope with only a few scattered rock outcrops to serve as fire breaks between the creek bottom and ridge tops. The monument boundary with adjacent BLM land follows the ridge tops. Shrub density does decrease towards the ridge tops which could slow fire spread in all but extreme conditions. Specific areas include:

- Douglas fir stands on Grassy Cone and Little Cottonwood Canyon with high fuel loads and steep slopes.
- Great Basin wildrye stand at the confluence of Little Cottonwood and Leech Creek with high fuel loads of fine fuels.

4) North End / Watershed Protection FMU Values to be Protected and Special Concerns

- Watershed conditions above spring boxes for the potable water system.
- Research Camp.
- Water treatment structure adjacent to Group Campground.
- Above ground power line on east side.
- Structures associated with underground power line and water wells.
- Sagebrush steppe habitat

f. FMU 1 - Fire Management Areas

FMU I is further subdivided into four individual fire management areas in terms of tactical suppression.

Fire Management Area 1: Suppression: Includes areas in the drainage's of Little Cottonwood and Leech Creeks. Most areas in this zone have slopes in excess of 20%. The vegetation is comprised of primarily sagebrush-grass, upland aspen, Douglas-fir, and riparian communities. Vehicle access is moderate to poor and limited to the lower portions of the valleys. Fires in this unit will tend to spread up slope and out of NPS managed lands. The ridge above Little Cottonwood is dominated by low sagebrush and Sandberg bluegrass vegetation which will help contain the fires in that portion. All fires will be suppressed in this unit.

Fire Management Area 2: Suppression. Includes the Great Basin wildrye community at the base of Little Cottonwood Creek and is composed of that single vegetation type. The topographic position make a natural ignition unlikely. However, the abundant fine fuels (>15,000 kg/ha)(15 tpa) make fire spread likely if an ignition occurs. Vehicle access is good.

Fire Management Area 3: Suppression. All areas dominated by sagebrush-grass vegetation with slopes less than 20%. Vehicle access is moderate. Lava and cinder outcrops and other fuel breaks are common. All wildfires will be suppressed due to the high probability of fires crossing the boundaries of CRMO onto adjacent lands.

Fire Management Area 4. Suppression: Areas of Sunset and Grassy Cones with slopes greater than 20% are included in this unit of FMU I. The lower slopes of Fire Management Area 4 are dominated by a variety of perennial grasses intermixed with mountain big sagebrush vegetation types. The upper slopes are dominated by stands of Douglas-fir. There is vehicle access to the bottom of both cones. The possibility of natural ignition from lightning is high. The possibility of human caused ignitions are probably greatest in this unit of all in CRMO due to the slope, high loads of fine fuels, and the proximity of the highway and the group campground. All fires will be suppressed in this unit due to the high probability of fires burning onto adjacent lands beyond the CRMO boundary.

2. Outstanding Natural Features and Interpretive FMU (FMU 2)

This FMU will be managed under a conditional fire use strategy where management will have the option to implement an appropriate management response to suppress wildland fires in situations where fire use is precluded due to concerns regarding safety, public use or structure protection.

a. FMU 2 Physical Description

This FMU includes that portion of the monument south of Highway 93 but outside of the wilderness area. It encompasses the vast majority of the monument's facilities including the Visitor Center Complex, campground, trails and seven mile scenic drive.

This 4,547 acre area contains the large concentration of geologic features including lava flows, cinder cones and craters. Elevations range from 5,730 feet near Devil's Orchard to 6,357 feet atop Silent Cone. The area is characterized by sparsely vegetated lava flows and cinder gardens along with stands of limber pine and limited areas of sagebrush and antelope bitterbrush. All areas are within .6 of mile of a paved road.

This FMU is accessible from Highway 93,20/26 or portions of the scenic drive. The unit is bordered by FMU 1 on the north and FMU 3 on the south and east. FMU 2 only borders adjacent BLM land for a few hundred feet on the south side of the highway at either end of the monument.

b. FMU 2 Strategic Management Objectives

Within this FMU all wildland fires will be suppressed using an appropriate management response with the intent of minimizing loss of structures and property. The first priority during these suppression actions will be the safety of personnel and the public. A secondary priority will be achievement of resource benefits from wildland fire use where fires are ignited by natural means, are confined by adequate natural fire breaks and pose little risk to the public.

Management of FMU 2 is designed to meet the following FMP objectives.

- 1) All fire management activities will have as the highest priority firefighter and public safety.
- 2) Emphasis will be placed on managing naturally ignited fires for resource benefits unless safety, public use, or facility (including structures, utilities, and exhibits) protection concerns over-ride such use.
- 3) Apply mechanical hazard fuel reduction around vulnerable structures, utilities or cultural sites for protection from fire damage.
- 4) Strong interagency fire and emergency services agency participation will be encouraged within this FMU.
- 5) Minimize serious and prolonged (>24 hours) smoke impacts to public use of the scenic drive.

c. FMU 2 Management Constraints

- 1) Smoke management reporting procedures for burning in Idaho will be followed.
 - 2) Employ minimum impact suppression tactics.
 - 3) No off road vehicle use unless approved by the Superintendent.*
 - 4) No dozer or grader use unless approved by the Superintendent.
 - 5) Protection mitigation measures for known historic and cultural resource sites must be assured.
 - 6) Chainsaw use should be minimized.
 - 7) Low level aircraft use and retardant must be approved by the Superintendent.*
 - 8) All fire management activities will consider safety of personnel and the public as the highest priority.
 - 9) Monument neighbors, park visitors and area residents will be notified of all planned and unplanned fire management activities that have the potential to impact them.
 - 10) All park closures are at the discretion of the Superintendent.
 - 11) No fire management operations will be initiated until all personnel involved receive a safety briefing describing known hazards and mitigating actions, current fire season conditions and current and predicted fire weather and behavior.
 - 12.) Fire management operations will be carried out by qualified individuals that promote the safe and skillful application of fire management strategies and techniques.
 - 13.) Smoke impacts to visibility along Highway 93 and resulting traffic safety concerns must be factored into suppression tactics.
 - 14.) Current or predicted (24 hours) burning indexes exceeding 60 will trigger a suppression response for all fires in FMU 2 using appropriate management response. Ensure MIST guidelines are used in efforts to contain wildland fires.
- * Unless an emergency situation exists and waiting for approval would risk life or serious injury.

d. FMU 2 Historic Role of Fire

Fire has been a dominate factor in shaping vegetative patterns since the active periods of volcanic activity from 15,000 to 2,100 years before the present. Since then lightning ignited fires have continued to shape the vegetative composition and structure. The current landscape consists of pockets of vegetation surround by barren lava flows and cinder fields. These extensive fuel breaks have limited the spread of fires. The wide spread occurrence of limber pines, a fire sensitive tree, indicates many areas have been isolated from fires and that fire frequencies are fairly long on average.

e. Wildland Fire Management Situation

1). Fuel characteristics and Fire behavior

Limber pine, mountain big sagebrush and antelope bitterbrush are the only significant fuel types represented in FMU 2. Limber pines grow in sparse stands generally without continuous canopies but occasionally have a dense understory of antelope bitterbrush.

Many of the reported fires were single trees ignited by lightning. The area is subject to high winds from the southwest.

2) Control problems

Severe weather conditions are required to sustain ignition and cause spread of fires via spotting from isolated patches of vegetation. However, once fire has reached the crowns of denser stands of limber pines, it is much more difficult to control (much greater intensities/flame lengths). Specific areas with potential control problems include :

- Limber pine stands on the northeast slope of Inferno Cone
- Mountain big sagebrush northeast of the Visitor Center
- Limber pine stands on Broken Top

3) FMU 2 Values to be Protected and Special Concerns

- Visitor Center complex including the residences and campground.
- Utility lines, microwave tower, and interpretive wayside exhibits.
- Smoke impacts to the Visitor Center complex and highway traffic.

f. Fire Management Areas within FMU II

Fire Management Area 5: Suppression. This zone includes the Visitor Center, maintenance buildings, housing area, and campground including the small cinder cone to the east of the Visitor Center. The entire area is included within Fire Management Area 5 within Fire Management Unit II. This fire suppression unit is composed primarily of lava flows and cinder gardens. A small area of sagebrush grassland occurs northeast of the visitor center. This is the only portion that has a high potential of spread to the monument boundary. All fires will be suppressed in this FMA due to the proximity of structures and high visitor use areas.

Fire Management Area 6: Appropriate Management Response/Wildland Fire This area includes the area adjacent to the CRMO scenic drive and contains the volcanic features seen by most monument visitors. The area is of most recent volcanic origin and consequently is highly dissected by lava flows and cinder gardens and is only capable of sustaining a large fire under extreme weather conditions.

This unit is very accessible due to proximity of the loop drive and does have a number of plant communities which, while small in size, do contain adequate

fuels to sustain fire spread. These are predominantly limber pine and bitterbrush vegetation types. Charcoal evidence indicates that many of these communities have burned in the past. However, the fires were small due to the numerous natural fuel breaks. The presence of limber pine make natural ignition from lightning a likely source of fire. The region adjacent to the Tree Molds parking lot has the greatest likelihood of human-caused ignition. The fuels are dense and continuous. This area has burned in the recent past. Areas near the Tree Molds parking lot and on the south side of Silent Cone present the only possibility of a fire burning out of the FMA.

Due to the small area that a fire is likely to spread and the possible damage caused by suppression, the use of natural barriers and minimum impact suppression techniques (MIST) will be incorporated to mitigate suppression impacts. Wildfires with fire-line intensities greater than 400 Kcal/m/s (500 Btu/ft/sec.) are likely to present serious control problems related to spot fires and crowning (Rothermel 1983) so timeliness of initial attack in these circumstances is important. The limber pine stands on the east side of Inferno Cone are of major importance as a deer fawning area and alternate use areas are not readily available.

3. Wilderness\Wildland Fire Use FMU (FMU 3)

a. Wildland Fire Use Physical Description

The largest portion of the monument is included within this FMU which is designated as Wilderness. It contains a wide variety of vegetation types including: mountain big sagebrush, antelope bitterbrush and limber pine. The major vegetated portions are surrounded by sparsely vegetated lava flows and cinder gardens that are incapable of supporting a fire. This will result in containment of most fires in this FMU of the monument except those potential cases indicated in Fire Management Area 7. The Wilderness Subzone is further subdivided into 5 Fire Management Areas 7-11.

Access within FMU 3 can be very difficult. No roads and only a few trails exist internally and even most areas outside of the wilderness/monument boundary are inaccessible. The northern portion of the wilderness boundary lies as little as .2 mile from paved roads. Remote sections in the southern portion of the monument are up to 8.5 miles from the nearest paved road and 4.5 miles from the nearest vehicle access of any kind. Ground access to many areas requires walking across miles of rugged lava flows.

These factors and a lack of water, dictate significant staff or the use of helicopter support for fire fighters or fire monitors working in remote areas.

b. Wildland Fire Use FMU 3 Strategic Management Objectives

- The main objective for the Wildland Fire Use FMU is to ensure natural processes and native flora and fauna diversity are restored through fire use.
- Personnel and public safety are the highest priority for all fire management activities.
- All wildland fires which do not meet resource objectives will be suppressed using an appropriate management response..
- Wildland use fire will be used where and when appropriate as a tool to enhance wilderness resources, and where acceptable, across monument boundaries to attain resource management objectives.
- Fire restored as an ecological process.
- The effects of fire on the ecosystem identified.
- Monument neighbors, park visitors and the local residents will be notified of all planned and unplanned fire management activities that have the potential to impact them.
- Area closures will be implemented at the discretion of the Superintendent.
- Fire management operations will be carried out by qualified individuals that promote the safe and skillful application of fire management strategies and techniques.

c. Wildland Fire Use FMU 3 Management Constraints

- Wildland fire operations within the Wilderness Area will adhere to the requirements of the Wilderness Act, NPS Management Policies, and NPS Director's Orders 18 and 41 (Wilderness Preservation and Management).
- No fire management operations will be initiated until all personnel involved receive a safety briefing describing known hazards and mitigating actions, current fire season conditions, and current and predicted fire weather and behavior.
- Smoke management reporting procedures for burning in Idaho will be followed for all fire use operations.
- All fire management activities within FMU 3 will employ minimum impact tactics.
- Minimum requirement (tool) protocols (DO-41) will be applied in decisions regarding tactics and tools to employ within wilderness.
- No motorized equipment or mechanized transportation may be used unless approved by the Superintendent.
- No dozer or grader use.
- Use of low flying aircraft to make water or retardant drops or to land within the wilderness area must be approved by the Superintendent (except in life-threatening emergency situations).
- Helispots will not be constructed.

d. Wildland Fire Management Situation

1) Control Problems - (See Fire Management Area descriptions below)

2) Wildland Fire Use FMU 3: Values to be Protected and Special Concerns -

The primary values in FMU 3 are wilderness related. These include maintaining natural conditions and an appearance of lands affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; and opportunities for solitude. In the case of wilderness, fire is a part of the natural condition and fire suppression is an imprint of man.

Fire Management Area 7: Wildland Fire Use. This unit is located in the vicinity of Big Cinder and Half Cone Buttes and is dominated by limber pine vegetation types with dense bitterbrush understory and bitterbrush vegetation types. While many communities contain relatively high fuel loads, the spatial continuity is low due to recent lava flows and cinder gardens. The potential spread of a fire is therefore limited. Fires have little potential to burn into FMU 2 (Outstanding Natural Feature Zone) with the exception of three locations: 1) southwest of Silent Cone, 2) north of Big Cinder Butte and 3) fires that occur adjacent to the Tree Molds parking area. These may possibly spread out of Fire Management Area 7 if ignited under severe burning conditions and winds from the south. If predicted fire behavior exceeds conditions of 1) flame lengths greater than 2.5 m (8.2 ft), 2) fire line intensities greater than 400 Kcal/m/s (500 Btu/ft/s), and 3) a southerly wind; the fires will be considered for suppression.

Fire Management Area 8: Wildland Fire Use. Limber pine communities which have developed on lava dominate this unit. The amount of fuel is very low and they are likely to spread only under extreme weather conditions. Fire Management Area 8 is subdivided into three discrete sections located near Echo Crater, Sheep Trail Butte, and west of Coyote Butte.

Fire Management Area 9: Wildland Fire Use. This unit is located in the sagebrush-dominated communities of Coyote Butte and Little Prairie. Fuel loads are relatively high in some locations and past fires have been of moderate size (50-100 ha/120-250 ac). Fires ignited in this unit could readily burn into Fire Management Areas 7 and 8.

Fire Management Area 10: Wildland Fire Use. This unit is composed of small isolated tracts of vegetation in southern portions of the monument between Fissure and Two Point Buttes. Since the areas are small, ignitions in these areas will be rare and the fires small when they do occur. Vegetation is composed primarily of low density limber pine communities.

Fire Management Area 11: Wildland Fire Use. Carey Kipuka, Round Knoll and other small kipukas on the monument comprise this FMA. The vegetation is primarily a mixture of sagebrush communities. If ignited the entire kipuka could burn due to the high fuel loads and limited access. In all but the most extreme conditions, fires would be unlikely to spread to another Fire Management Area or off the monument.

VII. Wildland Fire Management

Interagency recognition of risks and expenses associated with wildland fire management culminated in a December 1995 Final Report of the Federal Wildland Fire Management Policy and Program Review, issued by a team of fire management experts. The Secretary of the Interior has accepted and endorsed the principles, policies, and recommendations contained in the report, and has directed the NPS to implement them. NPS fire management activities will be performed in accordance with the principles, policies, and recommendations of the Final Report of the Federal Wildland Fire Management Policy and Program Reviews (DO-18).

The document, "Wildland and Prescribed Fire Management Policy, Implementation Procedures Reference Guide," represents an interagency effort designed to provide standardized procedures to guide immediate implementation of the policy described in the 1995 Federal Wildland Fire Management Policy and Program Review. The CRMO Fire Management Plan incorporates in the implementation procedures, including the use of Wildland Fire Implementation Plans and Wildland Fire Situation Analysis, from the Reference Guide.

Much of this section is based on The Wildland and Prescribed Fire Policy Implementation and Reference Guide 1998. It is imperative that the user of this fire management plan become familiar with that guide.

A. General Management Considerations

The Wildland Fire Implementation Plan, Stage I, provides the decision framework for selecting the appropriate management response. The Stage I analysis includes the initial fire assessment and the go/no go decision criteria checklist. It documents the current and predicted situation and all appropriate administrative information. It also provides the manager with decision criteria to make the initial decision of whether to manage the fire for resource benefits or to take suppression action. Refer to page 34, Chapter 4, Reference Guide.

1. General Management Plan (GMP) Review

Prior to determining the appropriate management response, it is important for the decision-maker to understand the (GMP) direction and how it can be applied to wildland fire.

Appropriate management responses do not seek to limit fire size as a primary objective. Rather, they should be based upon:

- public and firefighter safety

- protection of public health within the monument and other inhabited areas near CRMO and avoiding visibility impairment of air quality
- cost expenditures should be commensurate with values to be protected
- protection of cultural, historic and natural resources from fires
- limiting fire-line construction through use of existing barriers such as the existing roads or rock areas.
- protection of park improvements (buildings, roads, campgrounds, etc.)
- preventing fire spread from CRMO onto surrounding public lands unless accepted by BLM.

2. Decision criteria checklist for a go/no go decision

The initial fire assessment includes the Fire Situation and Decision Criteria Checklist included in the Wildland and Prescribed Fire Management Policy: Implementation Procedures Reference Guide (Chapter 4.C.). These and the criteria listed in Appendix O shall be considered and evaluated. GO decisions require the approval of the Superintendent (unless delegated in writing to others).

B. Wildland Fire Use

1. Rationale for Fire Management Strategies

Fire is an integral component of the CRMO ecosystem and is an appropriate tool for managing natural resources at the monument. Wildland fire managed for resource benefits will produce a wide range of fire intensities and severity. Diverse fire effects will result in mosaics of vegetation composition and age classes across the monument landscape. The diversity of plant and animal species will result in a more resilient ecosystem.

2. Objectives of Wildland Fire Use

The objective of the wildland fire use program is to allow natural ignitions to restore fire as an ecological process. Extensive lava flows create natural barriers to fire spread and will generally confine fires to areas less than 1,000 acres. However, a 1,000 acre limit to the size of these fires is not a fire management plan objective. The largest fire recorded within the fire use zone was a 1,900 acre fire on Little Prairie in 1992. Wildland fire use will only be considered for fires resulting from natural ignitions within Fire Management Units 2 or 3.

3. General Plan for Wildland Fire Use

The general plan for wildland fire use will prepare CRMO for effectively managing wildland fire use operations.

January-June (preseason):

- Update weather data for use in long-term fire spread projections to support fire use decisions (obtained from BLM).
- Review the FMP and Wildland and Prescribed Fire Implementation Policy Reference Guide process and track fire season severity to support fire use decisions.
- Ensure that fire use monitoring skills are available in the local area (Upper Snake River) to support fire use operations during the fire season.
- Review and update interagency agreements to ensure that resources are available to support fire use decisions.
- Contact the Idaho Department of Environmental Quality for updated status of the South Idaho Cooperative Smoke Management Plan.
- Minimum training targets should include an ICT3, RXFS and an RXFM.

May-October (fire season):

- Monitor daily fire weather using in-monument sources, fire weather stations maintained by BLM Shoshone and National Weather Service forecasts.
- Determine availability of wildland fire monitors during periods of favorable fire use conditions.
- Quantify and report wildland fire use emissions for the Southern Idaho Smoke Management Program coordinator during extended (>72 hours) events.
- Update local cooperators on wildland fire use options so that candidate fires are not suppressed until the superintendent has had an opportunity to make the go/no go decision.
- Evaluate areas within FMU 2 & 3 where candidate fires would likely meet resource management objectives.
- Track fire season severity against historical averages.

4. Staff responsibilities

If wildland fire complexity escalates to Stage II of the Wildland Fire Implementation Plan (WFIP), or during multiple Stage I/II fires, the staff of CRMO will require assistance to complete fire spread modeling and Maximum Manageable Area (MMA) development. CRMO should resource order a Prescribed Fire Behavior Analyst (RXFA) to assist in planning and documentation of wildland fires.

Superintendent

Responsible for making the Go/No Go Decision (unless delegated in writing to

others), signing the Wildland Fire Implementation Plan (WFIP) and periodic assessment to validate the WFIP decision. Declares park closures when needed. Will issue a written delegation of authority in the event a Fire Use Management Team is assigned to a wildland fire use project at CRMO. Ensures that fire information is managed as described in CRMO fire management plan.

Collateral-duty Fire Management Officer /Chief Ranger

Responsible for ensuring that the FMP fire preparedness and suppression programs are managed within RM-18 guidelines. Provides technical assistance in respect to WFIP planning, staffing assistance in respect to monitoring and advisory assistance in terms of escalating staffing due to increases in complexity and fire behavior. Evaluates fire activity in terms of public and employee safety and makes recommendations to the superintendent for closures. Patrols to ensure closures are enforced. Designs and implements the park evacuation plan at the discretion of the superintendent.

Chief of Resources Management

Ensures that a comprehensive fire management plan at the monument is developed and implemented. Responsible for analyzing fire weather and fire season severity to support fire use decisions, preparing WFIP stage I and the Relative Risk Rating Chart on all candidate wildland use fires. Establishes the review timeframes for periodic assessment on all declared wildland fire use projects. Completes or assists with WFIP Stage II, coordinates with state air quality, local wildland fire agencies and orders resources as needed, such as monitors, prescribed fire behavior analyst or a Fire Use Management Team. Provides input into Maximum Manageable Area (MMA) and long term risk assessment in accordance with Stage III.

Duty Officer(out of park resource until training targets are reached)

A duty officer will be available throughout the season for coordinating initial attack/extended attack on wildland fires within monument boundaries. The Duty Officer will be a qualified Division Group Supervisor or Type III IC as a minimum. If these skills are not available through monument personnel, assistance from outside sources will be solicited. The monument will seek to maintain at least one qualified duty officer.

Administrative Officer

Acts as comptroller for project. Tracks expenditures daily against the fire account, reports expenditures to the superintendent and prepares a final financial package as an official record of the project that will be reviewed during program audits.

Prescribed Fire Behavior Specialist- RXFS (out of park resource until training targets are reached)

Facilitates the information gathering, analysis, planning and implementation of WFIP. May be pre-positioned in the park when fire weather is conducive to wildland fire use. Must be on site within 12 hours of a WFIP Stage I "go"

decision.

Prescribed Fire Behavior Analyst - RXFA (out of park resource)

Performs long term risk assessment using advanced fire spread modeling technology. Models smoke emission and transport for documenting air quality impacts. Provides input into MMA and decision trigger point development. Should be ordered when complexity is anticipated to escalate beyond stage II.

Prescribed Fire Behavior Monitor (out of park resource until training targets are reached)

Monitors and documents fire weather, behavior, fuel consumption and map location. Provides feedback to the Chief of Resources Management in terms of fire use and resource management objectives. May be pre-positioned in the park when fire weather is conducive to wildland fire use. Must be on site within 12 hours of a WFIP Stage I “go” decision.

External Resources

- Support will be needed for CRMO to implement wildland fire.
- NPS Fire Use Modules: can provide both planning and operational assistance related to wildland fire use fires.
- Local BLM and Forest Service personnel can assist with implementing wildland fire use fires.
- BLM and Natural Resource Conservation Service can provide consultation related to site potential and restoration.

5. Factors to be Monitored for Decision-Making

Factors that must be monitored in order to make informed wildland fire use decisions are listed below. The application and source of each factor are also listed. These factors must be monitored daily when considering wildland fire use decisions.

Factor	Application	Source
NFDRS	Relative Fire Danger	RAWS - Arco/Potter Butte
Risk Assessment - RERAP	Historical Weather Data	CRMO Station 102260 or nearest available
Regional Fire Activity - Preparedness Level	Resource Availability	Southern Idaho Interagency Dispatch Center
Smoke emissions	Air Quality	ID Air Quality Division FOFEM, NPSPUFF, SASEM or equivalent model
KBDI	Drought Index	WMIS Station

Fire Weather	Fire Behavior/Danger	National Weather Service, Pocatello
--------------	----------------------	-------------------------------------

The decision criteria used in the GO/NO GO decision (listed in Appendix O) shall be used in determining whether an ongoing fire shall continue to be managed for resource benefits. A Wildland Fire Situation Analysis is developed whenever a wildland use fire is shifted to a suppression response.

6. Relationship of WFU and Step-up Plan

The monument fire suppression preparedness step-up plan will also serve as a wildland fire use step-up plan, as both activities use the same data inputs and outputs.

7. Preplanned Implementation Procedures

All wildland fire use activities on the monument will follow procedures outlined in the Implementation Policy. There are no pre-planned activities, except staffing step-up, as outlined in the monument step-up plan and a fire exclusion strategy in all of Fire Management Unit 1.

8. Implementation Procedures not Preplanned

Those activities that are not pre-planned include established maximum manageable area (MMA), Decision Criteria Checklists, Risk Assessment, Complexity Analysis or Periodic Assessment interval. All of these planning items will be detailed at the onset of a wildland fire use project in the timeline established in the Implementation Policy.

9. Cost Tracking

Wildland fire use operations have the potential to be less intensely managed than suppression activities, and as a result be less costly. As such, a critical element of the wildland fire use program is to capture the data that proves this out. All costs associated with wildland fire use projects will be tracked by day. Costs will include all personnel services, service contracts, aircraft, supplies and equipment procurement. This should be captured on a spread sheet and included in the fire history record.

10. Outline for Project Records

It is critical that wildland fire use project records be maintained for future reference, especially if controversy surrounds the fire, such as air quality complaints. All wildland fires will be mapped with GPS and the coordinates archived as a GIS data layer. Other records should include:

- Wildland Fire Implementation Plan and all amendments and revisions.
- Wildland Fire Situation Analysis (if used).
- Monitoring reports and summaries of findings.
- Revalidation and certification documents.
- Fiscal reports.
- Project Maps.
- Daily weather records.
- Fire behavior predictions.
- Smoke emission and transport observations and modeling reports if required.
- DI-1202 Individual Fire Report (SACS entry required).
- Resource Orders used to mobilize resources.
- other information as appropriate for the situation such as photo points

11. Public Information on WFU

When Wildland Fire Use projects are implemented, information should be made available to the public to ensure understanding, acceptance, and support. Provide local media (newspapers, radio, and television) with briefings and photo/interview opportunities. Ensure staff are briefed and provide information concerning status of WFU. Coordinate with other agency public information specialists to ensure a consistent message is provided to the public. If WFU operation persists for extended periods and burns substantial area, consider ordering a public information specialist.

12. Potential Impacts of Plan Implementation

The potential external impacts of implementing a wildland fire use program at the Monument should be minimal. The topography and fuels of the area will not normally support large fire growth or long term extreme fire behavior. Extensive natural barriers to fire spread exists over much of the monument. As such, the threat of fires breaching well thought out MMA's is not great.

The Upper Snake River air-shed may be impacted during short or long term events. Other ongoing wildland fires and/or agricultural burning as well as forecasted weather conditions will be factored in WFU go/no go decisions. Emission and dispersal modeling will be very important to defend wildland fire use decisions. Air quality monitoring in real-time may become necessary if emission models predict NAAQS PM 10 or PM 2.5 standards could be exceeded for short time periods as a result of fires in the monument.

Road closures for public safety may also generate impacts on public use. As a result, the monument must be prepared to deal with public information requests.

Wildland fire use projects will also result in internal impacts to the monument. Supporting these projects will require a substantial commitment of staff time. While non-local resources can be mobilized to assist with these fires, local staff will certainly be required to participate in data acquisition, analysis, decision support, plan implementation and evaluation. However, as the program evolves and becomes productive, it will generate a statistical database in the FIREPRO budget allocation process where positions and funding is awarded. As such, fire management staff could be expected to increase and lessen the impacts of fires over time.

13. Exceeding existing WFIP - Selecting a New Strategy

a. Situations requiring a new strategy

A new strategy must be developed if a wildland fire use project exceeds the periodic assessment or the fire leaves the MMA boundary. A new strategy may need to be developed if the regional or national fire situation escalates and fire management resources are in short supply.

b. Information used to set incident priorities

Priorities for action if a fire requires a new strategy should be based first on safety of the public and firefighters. Secondary priorities include protection of private property and monument resources and improvements, and smoke sensitive areas, including the human health at the monument headquarters complex, the communities of Arco or Carey, the Idaho National Engineering and Environmental Laboratory or visibility impairment of highways or the Class I area (wilderness). Locations of sensitive resources (archaeological sites and sensitive plants and animals) can be identified from Resource Management staff and/or maps. Safety hazards should be identified by Ranger and Maintenance staff.

c. Implementation plan requirements

Use the incident action plan to develop organization. Use strategy and tactics that have been successful in the past. Take care to ensure MIST is not forgotten in the efforts to return the fire use action to prescription.

C. Wildland Fire Suppression

1. Range of Potential Fire Behavior

Fire behavior in the monument can range from fast moving surface fires in light fuels to stand replacement fires in small but dense stands of trees. For more detailed discussion refer to the fire behavior descriptions in Section IV.

2. Preparedness Actions

a) Prevention/Wildland Fire Use Educational Activities

Fire prevention includes all activities designed to reduce the number of human-caused wildfires that occur in the monument. The objective of the program will be to minimize preventable fires.

Prevention activities for CRMO may include prevention signing, prevention messages through interpreters and staff and prevention patrols during periods of very high fire danger (Staffing Classes IV-VI). Associated with prevention messages will be wildland fire use educational and project awareness messages tailored for the public.

Fire prevention and wildland fire use will be discussed at selected staff safety meetings in the early spring to make sure all members are aware of concerns and procedures regarding response to wildfires and actions related to prescribed and wildland use fires.

The monument may participate in fire prevention and safety fairs at local schools so that the general public is aware of the importance of fire prevention.

During periods of high fire danger (SC IV-VI), the general public and park visitors will be informed of conditions through press releases, interpretive media and, if necessary, the posting of signs at monument entrances, the visitor center, and the campground. The prohibition on open fires will be extended to the Group Campsite, Research Camp and amphitheater. Fuels along the section of Goodale's Cutoff west of the North End Road should be assessed to determine whether vehicle traffic should be curtailed due to the danger of accidental ignition from vehicle exhaust systems.

The first week of July is historically a high fire danger period. During this week, the visiting public will be reminded of the 36 CFR regulations regarding the use of fireworks in the monument, and the policy regarding contained fires. Patrols will be alert to fireworks use and illegal fires in the campground or wilderness.

b) Annual Training

Annual training will consist of annual fire fighter safety refresher training, first aid and other safety training for appropriate individuals. As an IC Type III should be on site (or available within two hours) throughout the fire season, this should be a training priority for CRMO.

c) Annual Preparedness Activities

January

- perform fire physical exams triennially (every three years) as per standards in RM-18, Fire Management Guidelines.

April

- pack test fire personnel annually, as per standards in RM-18 and
- update and submit fire qualifications to NIFC computer.
- Inventory fire equipment, order needed supplies and update equipment list. Includes both fire cache and personal equipment.
- Obtain or prepare signs for wilderness fire use fire interpretation.
- Review Step-Up Plan.
- Inspect fire cache and ensure that equipment is ready.
- Check the established Regional procedure for utilizing suppression and emergency preparedness accounts.
- Meet and coordinate dispatch procedures with BLM and other agencies.

May

- Check operation of light engine and all on board equipment.
- Carded fire-fighters check fire packs.

Mid-May to Mid-October (fire season)

- Operate light engine pump weekly

1st Week of July

- Post warnings regarding fireworks regulations
- Increase patrols during 4th of July weekend

November

- Critique fire season including all fire management activities (i.e. wildland fire suppression, use fires and mechanical fuel treatment, prevention, etc.).
- Winterize light engine and other equipment.
- Evaluate individual performance of monument staff to correct deficiencies and recommend personnel for training.
- Review and revise Fire Management Plan, if necessary.

d) Step-up Plan

The Superintendent or FMO has the ability to bump up one preparedness staffing class for unusual monument events that would increase the potential for wildland fire.

Preparedness activities during the fire season are based on the National Fire Danger Rating System (NFDRS). Fire days are broadly divided into five staffing classes according to the intensity of danger factors as indicated by the Burning Index (BI). The BI integrates the effects of weather, fuels, and topography to estimate potential fire behavior and the corresponding amount of effort required to contain a fire. The staffing classes relate to the expected severity of fire conditions.

Staffing class levels are based on the cumulative frequency distribution of the BI. Class IV and V represent the 90th and 97th percentile, respectively, of historic BI's. CRMO utilizes the BI and other fire weather observations from the BLM RAWS stations at Arco, Rock Lake (4250', 42.9°, 114.0°) and Potter Butte (4940', 43.2°, 113.5°).

Preparedness actions are based on the predicted fire weather before 1400 hours and on actual fire weather after 1400 hours for all staffing classes.

Table 1. Burning Index and Staffing Class	
0-20	I
21-40	II
41-60	III
61-80	IV
81-120	V
121+	VI

Fire conditions that typify each staffing class and the corresponding preparedness actions required are as follows:

Staffing Classes I and II (BI 0-40)

Conditions

Fires will present a low to moderate level of control difficulty. Fires occurring at this level may be controlled with existing forces. Wind speed and direction will determine severity of fire spread. Fine fuels will be drying.

Preparedness Actions

- Fire weather reviewed daily.

- Engine, hand tools and portable equipment in a state of readiness.
- If the LAL is between 4 and 6 for the next day automatically bump up to a staffing class 4

Suppression Actions

- One qualified employee will depart within five minutes for the fire location.
- Additional attack forces will be dispatched after size-up and upon request of the first firefighter to arrive.
- If necessary, cooperator assistance will be requested as described under the dispatch section.
- If the fire location is near a road, the monument's light engine will be dispatched.

Staffing Class III (BI 41-60)

Conditions

Fires will present a moderate level of control difficulty. Light fuels are becoming dry. Heavy fuels are drying. Mop-up will be more difficult and time-consuming.

Preparedness Actions

- All actions specified for Staffing Class I and II days will be conducted.
- Ensure that a minimum of two qualified fire personnel (one engine operator) are available for initial attack.
- Open fires prohibited in Group Campsite and Research Camp.
- If the LAL is between 4 and 6 for the next day automatically bump up to a staffing class 5

Suppression Actions

All suppression actions indicated for Staffing Classes I and II will be taken.

Staffing Classes IV and V (BI 60-120)

Conditions

Fire will present a moderate to high level of control difficulty. Initial attack and reinforcing crews may have difficulty controlling a fire at this level. All fuels are dry. Air temperature is high and humidity is low. Strong gusty winds are possible. Spotting may occur.

Preparedness Actions

- All actions specified for Staffing Class III days will be conducted.
- Notice of fire situation to all monument staff.
- Detection patrols will be increased.
- Fire Situation reports will be entered into the NIFC computer daily before 9:30 A.M.
- Visitor Center personnel will alert the public to fire hazards.
- Interpretive activities will include a fire safety message.

- Emergency preparedness funds (PWE 343) may be used to bring staff to required levels. However, regularly scheduled personnel will be used to the extent possible. It is recognized that both nonessential routine activities and project work may be postponed on Class IV and V days.
- Fire danger notices will be posted.
- Available wildland fire use monitors will be identified and ordered upon reports of ignitions.
- Open fires prohibited in Campground, Group Campsite Research Camp and Amphitheater.

Suppression Actions

All actions specified for Staffing Class III days will be taken.

3. Pre-attack Plan

Due to the small size and scope of the fire program at Craters of the Moon National Monument, no formal pre-attack plan has been written. Certain preparations and procedures are however established prior to and during the fire season. Some are mentioned in the Annual Preparedness Activities section, other pre-attack plans are informally discussed among the five person fire crew during practice or equipment maintenance assemblies. The value of a written pre-attack plan, or checklist, is however recognized. Such preparation will inevitable emerge as the fire program evolves into a more complex and operationally committed program.

4. Initial Attack

- a) Priority setting during multiple fire occurrence.

Fires occurring in FMU 1 will be considered of higher priority than fires occurring in FMU 2 or 3 (unless the latter fires pose a threat to structures or public safety). Fires occurring FMU 2 will be of higher priority than fires occurring in FMU 3. The following will be used to set priorities elsewhere.

- Vegetative cover map; any fire with continuous fuels up to and across the monument boundary or structures.
 - Cultural and historic site map
 - Park facility map
- b) Criteria for appropriate initial attack response consistent with GMP/RMP objectives:
- Public and firefighter safety
 - Protection of cultural, historic, and natural resources
 - Protection of improvements and private property

- Minimum fire-line construction
- Available suppression resources and response times
- Fire danger as determined by fuels, weather, and topography
- Use aircraft and mechanized equipment only where necessary to support above-listed criteria
- A confinement strategy may be selected for initial attack as long as it is not being used solely to meet resource management objectives.
- Resource benefits may be a by-product, but the strategy must be based upon the criteria listed above.
- A confinement strategy may also be selected in the WFS process when initial attack has failed to contain a wildland fire. When confinement is selected as the initial action, the same management process applies as for wildland fire use decisions. A WFIP will be prepared in stages as the fire management conditions change and associated considerations require additional attention.

Typical fire response times at CRMO vary depending on the staffing at the monument, other fire management activity in the local area, and time of day. During fire season when no other fire activity is occurring, and staffing is available, the CRMO light engine can respond to the nearest road access for fires within the monument within one hour in FMU 1 or 2 and up to three hours in FMU 3. Support from other agencies within BLM's Upper Snake River District area can respond to closest road access to a fire within three hours. Air tanker and helicopter attack can reach a fire within 1 hour. Support from outside the Upper Snake River dispatch area cannot be counted on arriving any sooner than eight hours after request.

- c) Restrictions and special concerns by management area (FMU).
See Section IV of this plan for description of FMUs.

FMU 1 - Take care to ensure MIST is used while containing wildland fires.

Several lava tube caves located within the older lava flows between Goodale's Cutoff and Grassy Cone are utilized as maternity roosts by Townsend's big-eared bats. Physical disturbance of the entrances and heavy smoke within the caves are concerns.

A concrete block shed housing the water treatment facility for the monument is located at the Group Campsite. The main electrical power line for the monument enters the monument from the east (¼ mile north of Hwy. 93) and crosses the highway 200 yards east of the Visitor Center. Above ground electrical boxes for an underground power line are located parallel to the North End Road from the Group Campsite to the water wells at the mouth of Little Cottonwood Canyon. All of these facilities should be given a high priority for protection.

FMU 2 - The proximity of fires to visitor use areas, visitor numbers and the size of the area of having continuous fuel allowing for fire spread should be considered. Fires burning in the sagebrush fuel type along Highway 93 (northeast of the headquarters complex) will be suppressed.

Should current or predicted (24 hours) burning indexes exceed 60 all fires in FMU 2 should be suppressed using appropriate management response. Ensure MIST guidelines are used in efforts to contain wildland fires.

FMU 3 - For Stage I "No Go" fire use decisions, initial attack should utilize an appropriate management response which considers the full range of available strategies. All of FMU 3 is designated Wilderness and suppression activities must conform with DO-41 and RM-41.

d) Escaped wildland fires

Information that should be used to set incident priorities:

- Objectives for each FMU involved in the fire
- Restrictions in areas of special concern
- Implementation plan requirements
- Social and political concerns
- Decision criteria matrix or flowchart including the risk assessment process
- Complexity decision process for transition from IA to extended action
- Park delegation of authority

5. Extended Attack and Large Fire Suppression

a) determining extended attack needs

Extended attack needs will be determined by considering the following:

Threats to life, property, and Monument resources
Availability of suppression forces
Current and expected fire behavior

b) Implementation plan requirements - WFSA development

Follow guidance in Wildland and Prescribed Fire Policy, Implementation Procedures Reference Guide and RM-18, Chapter 9.

c) complexity decision process from initial attack to extended attack

Follow guidance in RM-18, Chapter 9, Initial and Extended Attack.

6. Minimum Impact Suppression Tactics

- All fire management activities in CRMO will rely on tactics which do a minimum amount of resource damage while maintaining the safety of firefighters, personnel and the public as the highest priority.
- Superintendent approval is needed for off road use of vehicles and bulldozers, mechanized equipment and low flying aircraft in wilderness.
- Complete minimum impact guidelines are listed in Appendix J.

7. Rehabilitation

All suppression activities will be carried out in such a manner as to cause the least amount of resource damage. After the fire is declared out, all litter and trash will be removed. Dug fire-lines will be refilled and erosion control devices installed if necessary. Stumps will be flush cut. Logs and brush will be chopped and scattered or removed. The severity of the burn and its resultant impact will be considered in determining the need to seed or otherwise re-establish native plant species. Such efforts regarding landscaping and plants will be in full compliance with NPS Management Policies and given prior approval of the Regional Director. A rehabilitation plan, outlining what species are to be planted, techniques to be used, locations and cost estimates will be prepared before any action is taken.

8. Records/Reports

The Chief Ranger (or collateral duty FMO) is responsible for all fire related records and reports except the WFIP. This responsibility may be delegated in an incoming Incident Management Team for any fire escaping initial attack (extending beyond the first burning period).

Wildland Fire Implementation Plan (WFIP)

Stage I of a wildland fire implementation plan will be prepared for every wildland fire and will be the responsibility of the Chief of Resources. Should the Stage I "Go/No Go" lead to a fire use (Go) decision, development of stage II and III of the WFIP will be assigned to a Fire Behavior Analyst.

Individual Fire Reports (DI-1202)

The basic report for documenting a wildland fire is the Individual Fire Report (DI-1202). The report is valuable as it provides an historical record of the fire regime for the monument. As such, it is important that all fires that occur within the boundaries be documented using, at a minimum, this form. This includes fires that go out on their own when the location can be documented.

The DI-1202 is the basic document used by the National Interagency Fire Center (NIFC) to document a fire occurrence. Incidents known as Support Actions where monument personnel respond to fires outside the monument (including out of state) are reported on this form. It is impossible for an individual to receive credit for jobs performed on any fire unless NIFC has a record of that fire from the monument in the form of a DI-1202 and its attached Fire Number.

The Incident Commander for the fire is the person responsible for preparation of the Individual Fire Report. In most cases, this is the individual who put the fire out. That person may also want to complete a Case Incident Report (Form 10-343) for the fire but that would be in addition to the DI-1202. Fires will be sequentially assigned a fire number by calendar year, i.e. fires in 1989 are numbered 8901, 8902, etc.

A complete fire report will include the following attachments, if applicable:

- Any written policies, guidelines or authority statements signed by the Superintendent.
- Copy of the WFIP
- Copies of equipment purchased or personnel request orders.
- All situation maps.
- Personnel lists (including Emergency Time slips.)
- Press clippings.
- Accident reports.
- All weather data reports and records.
- Documentation of financial charges made against the assigned PMP.
- Rehabilitation plan.

The report is then submitted, in draft, to the Chief Ranger. Instructions for filling out the report are found in RM-18. That person will review the report for completeness. He/she will then enter the data into the monument database for permanent record keeping. That procedure also prepares a final draft of the form for the files. The information will also be entered into the Wildland Fire Management Computer System. Finally, a copy of the DI-1202 will be sent to the Regional Fire Management Officer for that person's records.

Fire Experience and Qualifications

The Wildland Fire Management Computer System at NIFC is the central repository for all individual fire experience and training records. The Chief Ranger/Collateral Duty FMO is the person responsible for entering all training and experience into the computer and ensuring the information is up to date.

Daily Situation Reports

Daily Situation Reports are required on those days when the Burning Index reaches the 90th percentile and the monument moves into Staffing Class IV and V or when a fire has occurred or is on-going. The Chief Ranger is responsible for the preparation of the report and entering it into the Wildland

Fire Management Computer System by 9:30 a.m.

Smoke Management Reports

Smoke Management reports will be made by the Chief of Resources as agreed to with the State of Idaho Department of Environmental Quality and any Federal Agencies.

Report of Fire

When a report of a fire is received, the following information should be collected from the reporting party:

- Name of reporting party
- Address
- Phone number
- Location of fire and extent
- If fire is reported in person, ask if the reporting party is willing to show the investigating ranger the location, otherwise, determine if the person can be re-contacted if there are additional questions.

Resource Order Form, NFES 1470

All assistance requests must be documented on the Resource Order Form, NFES 1470. These forms are designed to be transmitted verbally over the telephone. The order form is, in essence, an obligating procurement document.

Whenever an out-of-park incident management team is ordered, the Superintendent must provide a written limited delegation of authority (Appendix L) and a briefing package to the incoming Incident Commander.

Year-end Accomplishment

Completion of year-end accomplishment reports are the responsibility of the collateral FMO or FMO.

IIIX. Prescribed Fire Management

The use of prescribed fire within Craters of the Moon National Monument is not contemplated in this plan for two reasons; 1) the potential resource objectives of a prescribed fire program have not been sufficiently documented as yet; 2) the monument currently lacks qualified staff to develop and implement such a program. This does not indicate a decision regarding the appropriateness of prescribe fire at CRMO nor does it preclude incorporation of a prescribed fire program in future revisions of this plan. Any revision to include prescribed fire would require additional NEPA compliance.

IX. Fire Management Organization and Responsibilities

A. Organizational Structure of Park Fire Management Program

Craters of the Moon National Monument does not have a fire management organization. The Columbia Cascades Support Office FMO provides oversight and assistance as needed.

B. FIREPRO funding

Currently, all FIREPRO funding for CRMO is managed by the Columbia Cascades Support Office (CCSO) FMO. Funding is available for engine maintenance, personal protective gear for firefighters, and training funds (on an as-needed and available basis).

C. Fire Management Organization in Relation to Park Organization

The Chief Ranger at CRMO is responsible for wildland fire preparedness, suppression operations, and coordination on suppression operations with mutual aid organizations. The Chief of Resources Management is responsible for fire planning, wildland fire use implementation, wildland fire use monitoring, post fire site assessment and restoration. Both positions coordinate with one another, the Superintendent, the CCSO FMO and cooperating fire organizations on fire and resource management objectives, and all wildland fire implementation actions.

D. Superintendent's Responsibility for Periodic Assessment Signature

Periodic assessments for continued wildland fire use must be approved (signed) by the superintendent. For additional information see Wildland and Prescribed Fire Management Policy Implementation Procedures Reference Guide and RM-18, Chapter Nine.

E. Interagency Coordination

Interagency coordination and cooperation is integral to successful implementation of the fire management program at CRMO. Only small, slow-moving wildland fires can be managed within the current capabilities of CRMO. All other wildland fires will require external support by interagency cooperators. Annual review of cooperative agreements will ensure successful coordination.

F. Key Interagency Contacts

See Appendix B for a listing of all interagency contacts.

G. Fire Related Agreements.

See Appendix K for interagency and cooperative agreements.

X. Fire Research

Information regarding fire effects in some specific ecosystems is incomplete. This absence of information should not constrain fire program implementation. Rather, as new information becomes available fire related resource management objectives can be refined in an adaptive management style.

A. Previous and Ongoing Fire Research at CRMO

In the development of this plan fire research was conducted by the Cooperative Park Studies Unit at the University of Idaho under the direction of Dr. Gerald Wright. These studies document past fire occurrence, vegetation and fuel components, and made estimates of fire behavior. This information has been incorporated into this plan.

There are currently no ongoing fire research projects at CRMO.

B. Fire Research Needs and Opportunities

Fire research has limited funding within the National Park Service. However, if it is determined that significant information is needed concerning the effects of fire or fire exclusion park managers may submit requests through the annual FIREPRO budget call. Additionally, requests for research funding may be made through the Joint Fire Sciences Group.

As research opportunities become available, studies should be undertaken to determine effects of fire use within CRMO on exotic weeds, water quality, aspen regeneration, riparian vegetation, erosion rates, and wildlife habitat.

Implementation of the CRMO FMP should not be contingent on completion of research of the local fire regime and fire effects on vegetation. A large body of scientific information already exists regarding effects of fire and fire exclusion for the plant associations of CRMO. Although this research was accomplished in other geographic areas, the results may be applied to CRMO (taking care to identify site differences and any subtle differences in effects that those differences might cause).

XI. Monitoring

A. Monitoring Requirements

All NPS units applying wildland fire use and/or prescribed fire to accomplish resource benefits must prepare a Fire Monitoring Plan (RM-18). Four monitoring levels are recognized and parks must identify each of these in the plan. These levels include environmental planning, fire observations, immediate post-fire effects, and long-term change. These four levels are cumulative and must be linked to each other. This plan should be appended to the Fire Management Plan.

B. CRMO Fire Monitoring Plan

The CRMO Fire Monitoring Plan for Wildland Fire Use will be prepared independent of the Fire Management Plan and attached as an Appendix at a later time. Refer to Appendix M for the CRMO Fire Monitoring Plan. The focus of this monitoring program will be to study big sagebrush plant associations and cheatgrass response. The reason for monitoring is to verify current fire ecology research throughout the monument, and to monitor the invasion of exotic species.

The level of monitoring will be determined by current and predicted fire behavior. Large active fires will require qualified fire monitors recording fire weather readings onsite, estimating fire behavior parameters, noting fire effects, determining fuel moisture levels, and documenting fuel type fire behavior with photographs. Wildland use fires which are inactive or predicted to remain less than 10 acres may only require daily observation from lookouts or aircraft.

Reconnaissance monitoring provides a basic overview of the fire event. The data to be collected is as follows:

- Fire Cause (ignition system)
- Fire Location (origin)
- Fire Size
- Fuels and Vegetation Description
- Relative Fire Activity
- Potential for Further Spread
- Current and Forecasted Weather
- Resource or Safety Threats and Constraints
- Smoke Volume and Movement

Fire Conditions monitoring will be dynamic over the management period of the fire. Fire and/or resource management staff assess and determine the level of monitoring of these variables. We measure the following fire conditions:

Fire Monitoring Period – to be determined by the fire or resource manager.

Topographic Variables
Fire Behavior
Smoke Characteristics
Fuel & Vegetation Type
Current & Forecasted Fire

XII. Public Safety

The 1995 Federal Wildland Fire Management Policy mandates that “Public and firefighter is the first priority in every fire management activity.”

A. Public Safety Issues

Wildland fires can present a hazard to firefighters and to the public visiting the monument. The safety of all people in the area is the primary concern of the Incident Commander. In most cases, the small fires encountered within the monument make this a fairly simple concern.

B. Procedures for Mitigating Safety Issues

Usually the entire perimeter of the fire is easily monitored and there is little likelihood it will spread far. In these cases, the concern will be to keep the public out of the immediate fire area, far enough away that they will not hinder the suppression activities. Under no circumstance will anyone be permitted near a fire without the appropriate training and personal protective equipment.

In the case of a wildland fire that has potential for rapid spread, there will be a possibility that park visitors will be in areas of danger. Visitors will be informed at the entrance station and the visitor center regarding the fire and the area where caution should be exercised. Efforts will be made to inform backcountry hikers and campers of fire activity that may threaten them and what measures to take to stay safe.

In extreme situations where the rate of spread constitutes an immediate threat, all efforts should be made to alert backcountry hikers and campers of the danger. Signs will be placed at each trailhead warning hikers and backcountry users when wildland fires are being managed for resource benefits. Signs warning of possible smoke on the road will be placed on the park’s roads if smoke produced

during wildland fires create a safety concern. Roads may be closed or ranger escorted convoys established if visibility on Highway 93 or park roads is significantly impaired. Any closures or actions related to Highway 93 must be approved and implemented by the Idaho Department of Transportation and/or State Police.

Temporary closure of the monument or a portion may be needed when fire behavior has potential to endanger visitor and employee safety. When a fire threatens to escape from the park or has the potential to do so, adjacent authorities will be given as much advance notice as possible in order to take appropriate action.

XIII. Public Information and Education

A. Public Fire Information; Capabilities and Needs

As with all park activities, the presence of an informed public can go far in providing support for the fire management program at Craters of the Moon National Monument and fostering its goals. A concerted effort will be made to make the public aware of fire concerns at the monument including fire prevention messages, fire danger indices when they are high or extreme and the presence of on-going fires. Fire management messages will be introduced into interpretive programs where appropriate. The monument will participate in fire prevention activities in the community. Park visitors will be made aware of regulations regarding the use of fire within the monument. High fire danger notices will be posted in the campground, at the visitor center and at the monument entrances when needed. The local media will be informed of fire prevention concerns through news releases. Media access to fire scenes will be facilitated when it is safe to do so. When interest is warranted, a staff member will be designated as the contact person for all information requests.

B. Step-up Plan Information Actions

Refer to Step-Up Plan in Section IV, C, 2.d.

XIV. PROTECTION OF SENSITIVE RESOURCES

A. Cultural Resource Sites

1. Craters of the Moon National Monument lacks a cultural resource base map

indicating the location of archeological and historic sites. The availability of such a map is invaluable in preventing damage to such sites from emergency suppression operations or rehabilitation projects. A GIS compatible map of these resources should be developed and maintained in a secure location at the monument. Only a small percentage of the monument has been surveyed (contemporary survey standards) for cultural resources. The lack of a recorded site in any given area does not necessarily indicate that no sites are present.

2. Areas where ground disturbance activities are planned will be assessed by a cultural resource specialist and Sec. 106 compliance completed prior to initiation of such action. Suppression operations are generally considered emergencies exempt from Sec. 106 requirements.

B. Protection of Sensitive Natural Resources

There are no federally listed endangered species known to occur in the park. There are several species of special concern within the monument. A detailed discussion of these is the attached Environmental Assessment (Appendix C). An inventory of where these species occur in the park would be ideal for management purposes. Species locations and or habitat requirements would be helpful when planning fire activities. Some species may benefit from fire and others may not. For more information reference the environmental assessment of the Fire Management Plan.

Sage grouse are a species of special concern which are particularly influenced by fire. A fire that creates a mosaic of habitat with open areas supporting grasses and forbs adjacent to mature sagebrush improves brood-rearing habitat quality; however, the overall habitat quality for breeding sage grouse is improved only if adequate amounts of sagebrush remain for nesting. At the population level, sage grouse are more limited by nesting habitat (quantity and quality) than by brood habitat. The sage grouse breeding season is comprised of nesting and brood-rearing periods. Nesting and early brood habitat should have 15 to 25 percent sagebrush canopy coverage and about 7 inches or more of grass and forb understory. Late summer brood habitat consists of a variety of habitats including meadows and riparian areas. One third of the sagebrush habitat within the monument occurs in Fire Management Unit I, a fire suppression unit.

All paleontological remains will be protected and preserved during all fire activities and all newly discovered sites will be reported to park managers.

C. Modern Infrastructure and Developments

Urban-interface mitigation techniques should be applied to prevent or reduce negative impacts to modern developments within the monument's boundaries. Few other developments exist within a five mile radius of the monument boundaries.

XV. Air Quality/Smoke Management

A. Issues

The Craters of the Moon Wilderness Area is a mandatory Class I air-shed under the Federal Clean Air (CAA). Sections 160-169 of the Act establish a program to Prevent Significant Deterioration (PSD) of air quality in "clean air areas" of the country (i.e., attainment areas), which include Class I areas. Among the purposes of the PSD program are "to preserve, protect and enhance air quality in national parks, monuments, national seashores, and other areas of special national or regional natural, recreational, scenic or historic value." Congress provided additional protection for Class I areas in Section 169A of the Clean Air Act, which specifies a national goal of "remedying any existing and preventing any future manmade visibility impairment" in these areas.

The Federal Government has granted responsibility and authority to establish air quality standards and regulations to States. All NPS units are required to comply with the [National Ambient Air Quality Standards](#) (NAAQS) both inside and outside unit boundaries, and protect visibility in Congressionally-mandated Class I unit areas.

NPS fire management activities which result in the discharge of air pollutants (e.g., smoke, carbon monoxide, and other pollutants from fires) are subject to, and must comply with, all applicable Federal, state, interstate, and local air pollution control requirements, as specified by Section 118 of the Clean Air Act, as amended (42 USC 7418). These requirements are the same substantive, procedural, and administrative requirements that apply to a private person or other non-governmental entity. The U.S. Environmental Protection Agency issued Interim Air Quality Policy on Wildland and Prescribed Fires in 1998. Fires that occur in the wildlands (generally undeveloped areas such as forests, grasslands, etc.) fall into two categories, (1) planned or prescribed fires which are purposely started to meet specific land management objectives, and (2) wildland fires which are all other non-structural fires in the wildlands, including unwanted wildfires. EPA's interim policy applies to both wildland and prescribed fires that are managed to benefit resources or the environment. Under EPA's Policy, Federal prescribed fire projects would be considered to conform with the state implementation plan if they are managed under a certified basic smoke management program. The program must require regional coordination (cooperation of all jurisdictions in an airshed) when authorizing fires and real-time air quality monitoring at sensitive receptors, when warranted, in addition to the basic program components.

As this plan was prepared a number of air quality monitoring programs have been in place at CRMO. Those that relate to wildland fire emissions include, particulates (PM₁₀ and PM_{2.5}), and ozone. Particulate samplers (part of the IMPROVE Network) do not provide "real-time" output of particulate levels but can be referenced post-fire to determine levels reached during particular fire events.

The ozone monitor can provide "real-time" information on ozone concentrations (preliminary non-validated data).

Predictive models of smoke emissions and dispersion are run in Stage III of the individual Wildland Fire Implementation Plan (Implementation Procedures and Reference Guide for the *Wildland and Prescribed Fire Management Policy*). Stage III is usually developed within 48 hours of fire detection. In some small fire situations Stage II implementation actions are determined to be adequate. This determination is made through a Stage III Needs Assessment based upon relative risk (fire size, season, fire danger indicators, and potential complexity). Air quality values are one complexity element factored into the needs assessment. Results of smoke model predictions will be shared with the Idaho Department of Environmental Quality.

Smoke sensitive areas include; the monument headquarters complex, the communities of Arco or Carey, the Idaho National Engineering and Environmental Laboratory or visibility impairment of highways or the Class I area (wilderness).

B. Coordination with the State

CRMO will coordinate on smoke management issues with the Idaho Department of Environmental Quality and conform with the requirements of the South Idaho Cooperative Smoke Management Plan. The South Idaho Cooperative Smoke Management Plan is currently a voluntary program which emphasizes spring and fall prescribed burning. The program is being expanded to include smoke emissions from wildland fire use. The NPS will stay informed on the program's development to comply with its recommended actions.

C. Air Quality Management Objectives

When wildland fires are managed as Wildland Use Fires the following objectives will apply;

1. Smoke levels along Highway 93 should not decrease visibility below one mile.
2. Smoke levels in the immediate area of the Headquarters complex should not cause visibility to drop below 5 miles for more than 24 consecutive hours.
3. Visibility from Big Craters should not obscure a vista of Big Southern Butte or Echo Crater for more than 7 consecutive days. During any fire season there should be no more than two seven day periods in which this visibility threshold is exceeded.
4. NAAQS should not be exceeded and the South Idaho Cooperative Smoke Management Plan guidelines should be followed.
5. Following any wildland fire managed as WFU, data on particulate levels will be obtained for those fire days if available.

If these objectives are not met (or are predicted to be exceeded) a wildland use fire will no longer meet air quality objectives and appropriate management response will be initiated to achieve the objectives. These responses may vary but can include full suppression actions.

XVI. Fire Critiques and Annual Plan Reviews

All fire management plans are subject to informal review annually with formal review every five years.

A. Critiques

All fires occurring within the monument will receive at a minimum a review by those involved to evaluate such topics as: the initial response, “hotline” (on-going fire incident) review, control methods used, safety concerns, and the need for new and replacement equipment. This review will be conducted by one of the following: the Incident Commander, the Fire Management Officer, or the official who has designated fire program responsibilities. The purpose of this review is to recognize and document actions that were successful and identify and rectify actions that were unsafe or ineffective.

The superintendent will conduct closeout meetings with Incident Management Teams (IMT) to ensure a successful transition of the incident back to the Monument and to identify and evaluate incomplete fire business. Refer to Chapter 13, Exhibit 1 of RM-18 for a sample IMT closeout.

A regional or national level fire review may be conducted if one of the following occurs:

- Fire crosses the Monument boundary into another jurisdiction without the approval of landowner or agency.
- Fire resulted in adverse media attention.
- Fire involved serious injury or death, significant property damage, or has the potential to do so.
- Fire results in controversy involving another agency.

Refer to Chapter 13, Exhibits 2 & 3 of RM-18.

All entrapments and fire shelter deployments will be reported and investigated as soon as possible after the deployment incident. Refer to Chapter 13, Exhibit 4 & 5 of RM-18 for review directions and written outline format.

B. Plan Reviews

An informal fire management program review will be conducted annually to evaluate current procedures and identify any needed changes to the Monument FMP. A formal fire management review will be conducted every five years. The Monument Superintendent must approve significant changes to the body of this plan. The only exceptions to this procedure will include: grammatical corrections, minor procedural changes, deletions, corrections, and additions to the appendices. Copies of all changes will be promptly forwarded to the Fire Management Program Center. Changes requiring the approval and concurrence will be submitted with a new cover sheet for signature and dates, which will replace the original cover sheet upon receipt by the Superintendent.

XVII. Consultation and Coordination

A. Agencies consulted:

Bureau of Land Management, Shoshone and Idaho Falls Field Offices
Idaho Department of Environmental Quality
Idaho Department of Fish and Game
Idaho State Historic Preservation Officer

B. Persons consulted:

Diane Riley, Air Quality Analyst, Air Quality Management Unit, Division of Environmental Quality, State of Idaho.

Tom Nichols, Fire Management Officer, Pacific West Region, National Park Service, San Francisco CA

Don Wright, Regional Supervisor, Upper Snake Region, Idaho Fish and Game, Idaho Falls, Idaho.

Fire Management Officer, Shoshone Field Office, Upper Snake River District, Bureau of Land Management, Shoshone ID.

C. Plan Preparation

John Apel, Chief of Resources Management, Craters of the Moon National Monument, National Park Service, Arco ID

Rick Smedley, Fire Planner, Columbia Cascades Support Office, Pacific West Region, National Park Service, Portland OR

Ken Till, Fire Management Officer, Columbia Cascades Support Office, Pacific West Region, National Park Service, Seattle WA

Portions of this plan, particularly those related to vegetation and fire behavior estimations were prepared by Mack Barrington, Stephen Bunting, and Gerald Wright from the Cooperative Park Studies Unit (now the Idaho Cooperative Fish and Wildlife Research Unit, US Geologic Survey, Biological Resources Division), University of Idaho, Moscow, Idaho.

Appendix A - References Cited

- Albini, F.A. 1976. Estimating wildfire behavior and effects. USDA For. Ser. Gen. Tech. Rep. INT-30.
- Albini, F.A. 1979. Spot fire distances from burning trees- a prediction model. USDA For. Ser. Gen. Tech. Rep. INT-56.
- Ames, C.R. 1977. Wildlife conflicts in riparian management: Grazing. In: Importance, preservation and management of riparian habitat. USDA For. Ser. Gen. Tech. Rep. RM-43, pp. 39-51.
- Andrews, P.L. 1986. BEHAVE: fire behavior prediction and fuel modeling system- BURN subsystem, part 1. USDA For. Ser. Gen. Tech. Rep. INT-194.
- Arno, S.F. 1980. Forest fire history in the northern Rockies. J. Forestry 78:460-465.
- Arno, S.F. and G.E. Gruell. 1983. Fire history at the forest-grassland ecotone in southwestern Montana. J. Range Manage. 36:332-336.
- Barrett, S.W., and S.F. Arno. 1988. Increment-borer technique for determining fire history in coniferous forests. USDA For. Ser. Gen. Tech. Rep.
- Blaisdell, J.P., R.B. Murray and E.D. McArthur. 1982. Managing Intermountain rangelands- sagebrush-grass ranges. USDA For. Ser. Gen. Tech. Rep. INT-134.
- Bonnicksen, T.M., and E.C. Stone. 1982. Managing vegetation within U.S. National Parks: a policy analysis. Environ. Manage. 6:101-102 and 109-122.
- Brown, J.K. 1974. Handbook for inventorying downed woody material. USDA For. Ser. Gen. Tech. Rep. INT-16.
- Brown, J.K. 1982. Fuel and fire behavior prediction in big sagebrush. USDA For. Ser. Res. Pap. INT-290.
- Brown, J.K., R.D. Oberheu, and C.M. Johnson. 1982. Handbook for inventorying surface fuels and biomass in the Interior West. USDA For. Ser. Gen. Tech. Rep. INT-129.
- Bunting, S.C., L.F. Neuenschwander, and G.E. Gruell. 1985. Fire ecology of antelope bitterbrush in the northern Rocky Mountains. In: Fire's effects on wildlife habitat- Symposium proceedings. USDA For. Ser. Gen. Tech. Rep. INT-186, pp. 48- 57.
- Bunting, S.C., B.M. Kilgore, and C.L. Bushey. 1987. Guidelines for prescribed burning sagebrush-grass rangelands in the northern Great Basin. USDA For. Ser. Gen. Tech. Rep. INT-231.
- Burgan, R.E., and R.C. Rothermel. 1984. BEHAVE: fire behavior prediction and fuel modeling system-FUEL subsystem. USDA For. Ser. Gen. Tech. Rep. 167.
- Burkehardt, J.W., and E.W. Tisdale. 1976. Causes of juniper invasion in southwestern Idaho. Ecology 57:472-484.

Butler, D.R. 1986. Conifer invasion of subalpine meadows, central Lemhi Mountains, Idaho. Northwest Sci. 60:166-173.

Chaplin, M.R., and A.H. Winward. 1982. The effect of simulated fire on emergence of seed found in the soil of big sagebrush communities. In: Society for Range Management Abstracts, 35th annual meeting, Calgary, Alberta.

Cook, S.F. 1959. The effects of fire on a population of small rodents. Ecology 49:102-108.

Cooney, T.M. 1986. Predicting fire behavior with microcomputers. J. Forestry 84:14-16.

Cooper, C.F. 1961. The ecology of fire. Sci. Am. 204:150-160.

Daubenmire, R. 1970. Steppe vegetation of Washington. Washington State Univ., Pullman. Washington Agric. Exp. Sta. Tech. Bull. 62.

Davis, K.P. 1959. Forest fire control and use. McGraw-Hill, New York.

Day, T.A., and R.G. Wright. 1985. The vegetation types of Craters of the Moon National Monument. For., Wildlife and Range Exp. Sta. Bull. No. 38. University of Idaho, Moscow.

DeByle, N.V. 1976. The aspen forest after harvest. In: Utilization and marketing as tools for aspen management in the Rocky Mountains: Proceedings of the Symposium. USDA For. Ser. Gen. Tech. Rep. RM-29, pp. 35-40.

DeByle, N.V., and R.P. Winokur, eds. 1985. Aspen: Ecology and management in the western United States. USDA For. Ser. Gen. Tech. Rep. RM-119.

Deeming, J.E., J.W. Lancaster, M.A. Fosberg, R.W. Furman and M.J. Schroeder. 1972. National fire-danger rating system. USDA For. Ser. Res. Pap. RM-84.

Fischer, W.C. 1978. Planning and evaluating prescribed fires-a standard procedure. USDA For. Ser. Gen. Tech. Rep. INT-43.

Franklin, J.F., W.H. Moir, G.W. Douglas, and C. Wiberg. 1971. Invasion of subalpine meadows by trees in the Cascade Range, Washington and Oregon. Arct. and Alpine Res. 3:215-224.

Gipe, D. 1976. Response of range to burning. Tall Timbers Fire Ecol. Conf. 15:25-31.

Griffith, B. 1983. Ecological characteristics of mule deer: Craters of the Moon National Monument, Idaho. Cooperative Park Studies Unit, University of Idaho, Moscow.

Gruell, G.E., S.C. Bunting, and L.F. Neuenschwander. 1985. Influence of fire on curlleaf mountain-mahogany in the Intermountain West. In: Fire's effects on wildlife habitat-Symposium proceedings. USDA For. Ser. Gen. Tech. Rep. INT-186, pp. 58-72.

Gruell, G.E., J.K. Brown, and C.L. Bushey. 1986. Prescribed fire opportunities in grasslands invaded by Douglas-fir: state-of-the-art guidelines. USDA For. Ser. Gen. Tech. Rep. INT-198.

Habeck, J.R. 1974. Forests, fuels, and fire in the Selway Bitterroot Wilderness. Tall Timbers Fire Ecol. Conf. 15:305- 353.

Harniss, R.O., and R.B. Murray. 1973. Thirty years of vegetal change following burning of sagebrush-grass range. J. Range Manage. 26:322-325.

Harniss, R. O., S.J. Harvey, and R.B. Murray. 1981. A computerized bibliography of selected sagebrush species (genus Artemisia) in western North America. USDA For. Ser. Gen. Tech. Rep. INT-102.

Hironaka, M., M. Fosberg, and A.H. Winward. 1983. Sagebrush-grass habitat types of southern Idaho. For., Wildlife and Range Exp. Sta. Bull. No. 35. University of Idaho, Moscow.

Hobbs, N.T., and R.A. Spowart. 1984. Effects of prescribed fire on nutrition of mountain sheep and mule deer during winter and spring. J. Wildl. Manage. 48:551-560.

Houston, D.B. 1973. Wildfires in northern Yellowstone National Park. Ecology 54:1111-1117.

Johnson, A.H., and R.M. Strang. 1983. Burning in a bunchgrass/sagebrush community: the southern interior of B.C. and northwestern U.S. compared. J. Range Manage. 36:616-617.

Koterba, W.D., and J.R. Habeck. 1971. Grasslands of the North Fork Valley, Glacier National Park, Montana. Can. J. Bot. 49:1627-1636.

Krebill, R.G. 1972. Mortality of aspen on the Gros Ventre elk winter range. USDA For. Ser. Res. Pap. INT-129.

Kuntz, D.E. 1982. Plant response following spring burning in an Artemisia tridentata subsp. vaseyana/Festuca idahoensis habitat type. M.S. thesis, Univ. of Idaho, Moscow.

Langenheim, J.H. 1962. Vegetation and environmental patterns in the Crested Butte area, Gunnison County, Colorado. Ecol. Monogr. 32:249-285.

Lanner, R.M. 1980. Avian seed dispersal as a factor in the ecology and evolution of limber and whitebark pines. Sixth N. Am. For. Biol. Workshop Proc., Univ. Of Alberta, Edmonton. pp. 15-48.

Leopold, A.S., S.A. Cain, C.M. Cottam, J.M. Gabrielson and T.L. Kimball. 1963. Wildlife management in national parks. Am. Forestry 69:32-35 and 61-63.

Loope, L.L., and G.E. Gruell. 1973. The ecological role of fire in the Jackson Hole area, northwestern Wyoming. Quaternary Res. 3:425-443.

Lyon, L.J. 1971. Vegetal development following prescribed burning of Douglas-fir in southcentral Idaho. USDA For. Ser. Res. Pap. INT-105.

Lyon, L.J., H.S. Crawford, E. Czhai, and others. 1978. Effect of fire on fauna: a state-of-the-knowledge review. USDA For. Ser. Gen. Tech. Rep. WO-6.

Martin, R.E., J.D. Dell. 1978. Planning for prescribed fires in the Inland Northwest. USDA For. Ser. Gen. Tech. Rep. PNW-76.

Martin, R.E., H.E. Anderson, W.D. Boyer, J.H. Dieterich, S.N. Hirsch, V.J. Johnson, and W.H. McNab. 1979. Effects of fire on fuels: A state-of-knowledge review. USDA For. Ser. Gen. Tech. Rep. WO-13.

McConnell, B.R., and J.G. Smith. 1977. Influence of grazing on age-yield interactions in bitterbrush. J. Range Manage. 30:91-93.

Morris, M.S., R.C. Kelsey, D. Griggs. 1976. Geographic and ecological distribution of big sagebrush and other woody Artemisias in Montana. Montana Acad. Sci. 36:56-79.

Murray, R.B. 1983. Response of antelope bitterbrush to burning and spraying in southeastern Idaho. In: Proceedings- research and management of bitterbrush and cliffrose in western North America. USDA For. Ser. Gen. Tech. Rep. INT-152. pp. 142-152.

Parsons, D.J., D.M. Graber, J.K. Agee, and J.W. Van Wagtendonk. 1986. Natural fire management in national parks. Environ. Manage. 10:21-24.

Patton, D.T. 1969. Succession from sagebrush to mixed conifer forest in the northern Rocky Mountains. Am. Midl. Natur. 82:229-240.

Pechanec, J.F., A.P. Plummer, J.H. Robertson and A.C. Hull. 1965. Sagebrush control on rangelands. USDA Agri. Handbook 277. Washington, D.C.

Reed, R.M. 1971. Aspen forests in the Wind River Mountains, Wyoming. Am. Midl. Natur. 86:327-343.

Romme, W.H. 1982. Fire and landscape diversity in subalpine forests of Yellowstone National Park. Ecol. Monogr. 52:199-221.

Rothermel, R.C. 1972. A mathematical model for predicting fire spread in wildland fuels. USDA For. Ser. Gen. Tech. Rep. INT-115.

Rothermel, R.C. 1983. How to predict the spread and intensity of forest and range fires. USDA For. Ser. Gen. Tech. Rep. INT-143.

Schier, G.A. 1975. Deterioration of aspen clones in the middle Rocky Mountains. USDA For. Ser. Res. Pap. INT-170.

Sindelar, B. W. 1971. Douglas-fir invasion of western Montana grasslands. Ph.D. Diss., Univ. Montana, Missoula.

Spencer, D.L., and H.B. Hakala. 1964. Moose and fire on the Kenai. Tall Timbers Fire Ecol. Conf. 3:11-33.

Steele, R., R.D. Pfister, R.A. Ryker and J.A. Kittams. 1981. Forest habitat types of central Idaho. USDA For. Ser. Gen. Tech. Rep. INT-114.

Thomas, J.W., ed. 1979. Wildlife habitats in managed forests: the Blue Mountains of Oregon and Washington. USDA For. Ser. Agr. Handbook No. 533.

Tisdale, E.W, and M. Hironaka. 1981. The sagebrush-grass region: A review of the ecological literature. For., Wildlife and Range Exp. Sta. Bull. No. 33, University of Idaho, Moscow.

Uresk, D.W., W.H. Rickard and J.F. Cline. 1980. Perennial grasses and their response to a wildfire in south-central Washington. *J. Range Manage.* 33:111-114.

Vale, T.R. 1981. Tree invasion of montane meadows in Oregon. *Am. Midl. Natur.* 105:61-69.

Van Wagner, C.E. 1973. Height of crown scorch in forest fires. *Can. J. For. Res.* 3:373-378.

Van Wagner, C.E. 1977. Conditions for the start and spread of crown fires. *Can. J. For. Res.* 7:23-34.

Wright, H.A., and A.W. Bailey. 1982. *Fire ecology- United States and southern Canada.* J. Wiley & Sons, New York.

Appendix B

Craters of the Moon National Monument
Fire Incident
Contact Information

CRMO, P.O. Box 29, Arco ID 83213, (208) 527-3257, Fax (208) 527-3073

Name	Extension & Radio # Home phone #	Email or URL
Jim Morris, Superintendent	101 527-3321	
*Vacant, Chief Ranger	201 527-3354	
*Tammie Henderson, Park Ranger	202 527-3732	
*		
*John Apel, Chief of Resources Management	501 527-8573	John_apel@nps.gov
*Mike Munts, Biological Technician	502 527-8575	
Ken Till, FMO CCSO, Seattle	206-220-4257	
*Red-carded Park Staff		

Cooperating Agencies (FIRE)

Organization	Phone # FAX #	Address	Email URLs
USDI, BLM Shoshone, Fire Dispatch	(208) 886-7237 fax (208) 886-7316	400 West F Street P.O. Box 2-B Shoshone, Idaho 83352-1522	
USDI, BLM Idaho Falls Fire Dispatch	(208) 524-7600 fax (208) 524-7505	1405 Hollipark Drive Idaho Falls, ID 83401- 2100	
USDA, USFS Salmon/Challis NF Lost River District	(208) 588-2224	P.O. Box 507 Mackay, ID 83251	
National Weather Service, Pocatello	(208) 232-9306 fax (208) 233-2417	1320 Beechcraft Ave. Pocatello, ID 83204	http://nimbo.wrh.noaa.gov/Pocatello/Pocatello.htm
To Report Severe Weather	1-800-877-1937		
South Idaho Coop. Smoke Mgmt. Prog. Unit Liaison; Krista Gollnick-Waid	208-373-3856		www.smokemu.org
National Weather Service, Boise Idaho Fire Weather Forecast	Administrative Calls (8am - 4 pm)....(208) 334-9860 Local Forecast Recording.....(20 8) 342-6569	NIFC, NWS FORECAST OFFICE (NWSFO) BOISE 3833 SOUTH DEVELOPMENT AVENUE BUILDING 3807 BOISE ID 83705-5354	http://www.boi.noaa.gov/FIREWX/BOIFWFOI.html
Arco Fire Department	Emergency 911 (208) 527-8257		

Organization	Phone # FAX #	Address	Email URLs
	NPS Radio Channel 7		

Law Enforcement and EMS

Organization	Phone #	Address
Butte County Sheriff's Department	Emergency 911 (208)527-8553	256 West Grand Avenue Arco, ID
Blaine County Sheriff's Department	788-5555	210 1 st Avenue Hailey, ID
Lost Rivers Ambulance	Emergency 911	
Lost Rivers Hospital	527-8206	551 Highland Drive, Arco

Appendix E

Supplemental Information on Fuel Types

The plant communities of CRMO are highly diverse and range from those on recent lava and cinder material to well-developed Douglas-fir and sagebrush communities. The majority of vegetation of CRMO is not included in habitat types developed for southern Idaho (Steele et al. 1981, Hironaka et al. 1983). Neither of these works included sagebrush-grass or limber pine vegetation on recent volcanic material. The vegetation on the well-developed soils of the Pioneer Mountain foothills and in the Carey Kipuka are included in one of these habitat type classifications. Day and Wright (1985) described 26 distinct vegetation community types within the monument. This study uses the same types. It was determined that 20 of these community types had potential to sustain fire and these were combined into the nine broad vegetation groups discussed below. The correspondence of these groups with the types described by Day and Wright (1985) and the area of each is described in Table 1.

Rate-of-spread, rate of growth, fire intensity, and flame length are among the characteristics that can be estimated through the use of Rothermel's fire behavior model (1972) and Albini's nomograms (1976) and the PC version of BEHAVE (PC/BEHAVE)(Cooney 1986). The models do possess a number of general limitations and specific limitations related to sage communities. Brown's (1982) predictions are useful in predicting fire behavior in big sagebrush communities. PC/BEHAVE allows the use of the standard NFFL fuel models but also allows the user to develop custom fuel models that reflect existing vegetation and fuels. The result is better prediction of fire behavior for the site. Custom fuel models were developed to represent the conditions present in CRMO vegetation (Table 4). These are intended as initial fuel models to be modified further as the personnel of CRMO validate models as time progresses and actual field observations can be made.

The fixed inputs in the custom fuel models were extracted from information collected in the field at CRMO. Dead, live woody and herbaceous fuel loading information are summarized for the vegetation groups in Tables 5 and 6. Fuel depth data were extracted from Table 7 by vegetation group. This information is also available for each of the 20 community types described by Day and Wright (1985) that were sampled. Other values shown in Table 4 were determined through the experience of the authors and with the assistance of the PC/BEHAVE documentation. Fuel moisture of extinction is the fine fuel moisture at which the fire can no longer sustain itself. It is a sensitive variable in light fuels such as are present at CRMO. This variable requires further adjusting to the conditions present at CRMO as these data become available.

As an example of the use of this information, fire behavior was predicted for a mixture of mountain big sagebrush (85%) and low sagebrush (15%) vegetation. Inputs are shown in Table 8 and outputs in Table 9. The model can estimate fire behavior for a single vegetation type or it can utilize 2 vegetation types and calculate weighted values.

The predicted fire behavior for this example is included in Table 9. The rate-of-spread for the big sagebrush type is 80 m/hr (4 chain/hr) (1 chain = 66 ft). The rate-of-spread declines to 4 m/hr (13 ft/hr) when the fire burns into the low sagebrush vegetation type which indicates that the fire probably cannot sustain itself in this vegetation under these conditions and will go out. This is a realistic prediction as the fuels in low sagebrush are often inadequate to carry low intensity fires. Flame length and fireline intensity relate directly to the difficulty of fire control. When these values exceed 1.2 m (4 ft) and 80 Kcal/m/s (100 Btu/ft/m), respectively, the fire is normally too intense to be controlled directly by hand crews at the head of the fire. If flame length and fireline intensity exceed 3 m (10 ft) and 400 Kcal/m/s (500 Btu/ft/m), respectively, direct attack with machines is not advised. The fire in this example could be readily controlled with suppression crews. Areas dominated by low sagebrush vegetation could be used as fire control points.

The above parameters have been entered into NEWMODEL to create four fuel models specific to CRMO and are in the BEHAVE file titled CRMOMDLS (found in C:\FIRE). The four models are:

- Number 14 Mountain Big Sagebrush
- Number 15 Antelope Bitterbrush
- Number 16 Low Sagebrush
- Number 17 Great Basin Wild Rye
- Number 18 Aspen Woodland

By using BEHAVE FIRE1 these models will represent fire behavior in the various fire management unit based on actual conditions. Observed versus predicted conditions will be used to validate the fuel model.

Table 1. Areas occupied by each of the major plant communities, and their correspondence with areas mapped by Day and Wright (1985).

Vegetation type	Area occupied (ha)(ac)	Percent of vegetated area	Community types
Mountain big sagebrush	4069 (10,055)	63	4, 5, 6, 7, 8, 10
Low sagebrush	167 (413)	3	12, 13, 14, 15
Three-tipped sagebrush	41 (102)	<1	11
Antelope bitterbrush	562 (1389)	9	16, 17
Limber pine	1525 (3768)	24	21, 22, 23
Great Basin wild-rye	9 (22)	<1	20
Douglas-fir	29 (72)	<1	24
Upland quaking aspen	15 (37)	<1	25
Riparian zone	30 (74)	<1	26
Total	6447 (15931)	100	

Table 2. Effects of fire on understory species common to vegetation types of Craters of the Moon National Monument. More information on fire response of each species can be found in Harniss et al. (1981), Tisdale and Hironaka (1981), Wright and Bailey (1982), Blaisdell et al. (1982), and Bunting et al. (1987).

SPECIES	Short- (1-5 year) and long-term (5-25 year) effects of fire
GRASSES	
Bluebunch wheatgrass	Resistant to fires during most seasons of the year but may be damaged if grazed too severely the first spring following the burn. Productivity may decline the first season following the fire but recovers by the third year. In many instances, productivity is enhanced the first season.
Needle-and-thread	One of the most fire-sensitive species of this region. However, regeneration potential is high and species recovers within 10 to 15 years.
Western needlegrass	Species is moderately sensitive to fire but recovers quickly due to high regeneration potential. Early successional species on many sites and rapidly occupies area opened by fire.
Idaho fescue	Initial mortality of this species may be high as a result of the fire. Mortality may exceed 75% on severe burns but normally varies from 20-50%. It may require more than 25 years to recover if density is severely reduced.
FORBS	
Arrowleaf balsamroot	Very fire resistant but reproduction is infrequent following fire. Biomass production is enhanced by fire and will remain high until grasses or shrubs dominate the site.
Lupine	Very fire resistant. Populations may be enhanced through both seedling establishment and stimulation of sprouting from rhizomes. Will remain a community dominant until grasses or shrubs are abundant.

Table 3. Parameters for the custom fuel models to be used in PC/BEHAVE for predicting fire behavior in non-forested vegetation types in Craters of the Moon National Monument (Data collected on site by the authors).

Fuel characteristic ¹	Great Basin wild-rye	Antelope bitterbrush	Mountain big sagebrush	Low sagebrush
1-hr fuel load (T/ac)	3.01	0.75	0.68	0.20
10-hr fuel load (T/ac)	0.00	0.60	0.45	0.20
100-hr fuel load (T/ac)	0.00	0.35	0.75	0.00
Herbaceous load (T/ac)	1.80	0.12	0.18	0.00
Live woody load (T/ac)	0.00	1.50	3.00	1.00
1-hr S-V ratio (1/ft)	1500.00	1500.00	1500.00	1500.00
Herbaceous S-V ratio (1/ft)	1500.00	1500.00	1500.00	1500.00
Live woody S-V ratio (1/ft)	1500.00	1500.00	1500.00	1500.00
Fuel depth (ft)	2.50	2.00	1.85	0.40
Fuel heat content (BTU/lb)	8000.00	7000.00	8000.00	8000.00
Fuel moisture of extinction (0.01%)	0.25	0.25	0.25	0.25
Wind reduction factor (0.01%)	0.40	0.40	0.40	0.40
Model type (static/dynamic)	Dynamic	Dynamic	Dynamic	Dynamic

1) Imperial units of measure are used by PC/BEHAVE program as inputs and outputs.

Table 4. Parameters for the custom fuel models to be used in PC/BEHAVE for predicting fire behavior in forested vegetation types in Craters of the Moon National Monument (Data collected on site by Park Personnel).

Fuel characteristic ¹	<u>Vegetation type</u>		
	Aspen woodland	Limber pine	Douglas-fir
1-hr fuel load (T/ac)	2.50	1.16	2.50
10-hr fuel load (T/ac)	0.83	0.61	0.50
100-hr fuel load (T/ac)	2.20	0.82	0.90
Herbaceous load (T/ac)	0.16	0.05	0.18
Live woody load (T/ac)	0.50	2.00	1.50
1-hr S-V ratio (1/ft)	3000.00	2000.00	2000.00
Herbaceous S-V ratio (1/ft)	1500.00	1500.00	1500.00
Live woody S-V ratio (1/ft)	1500.00	1500.00	1500.00
Fuel depth (ft)	0.50	2.00	0.25
Fuel heat content (BTU/lb)	8000.00	8000.00	8000.00
Fuel moisture of extinction (0.01%)	0.18	0.18	0.25
Wind reduction factor (0.01%)	0.40	0.40	0.40
Model type (static/dynamic)	Dynamic	Dynamic	Dynamic

1) Imperial units of measure are used by PC/BEHAVE program as inputs and outputs.

Table 5. Down woody and duff fuel loadings for major vegetation type in Craters of the Moon National Monument (Data collected on site by Park Personnel).

Vegetation Fuel loading (kg/ha)/Tons/Acre

Fuel Timelag Classes

type	Class 1 (<0.62cm)	Class 2 (0.62-2.5cm)	Class 3 (2.5-7.5cm)	Class 4 (>7.5cm)	Total fuel loading _kg/ha_(ton/ac)	Duff depth (cm)
	1Hr.____	10Hr.____	100 Hr.____	1000 Hr.____		
MBS	384	1008	1690	1619	4,701(4.7 TPA)	-
TTS	90	63	-	-	153(.153 TPA)	-
LS	121	436	-	-	557(.557 TPA)	-
AB	658	1370	826	1265	4,119(4.2 TPA)	-
GBW	-	-	495	1150	1,645(1.6 TPA)	-
LP	429	1361	1831	2194	5,815(5.8 TPA)	1.0
DF	377	1120	1981	2531	6,009(6.0 TPA)	5.3
UQA	407	1868	4954	2531	9,760(9.8 TPA)	3.5
RZ	480	1750	5200	2700	10,130(10.1 TPA)	4.2

MBS=Mountain big sagebrush, TTS=Three-tip sagebrush, LS=Low sagebrush, AB=Antelope bitterbrush, GBW=Great Basin wildrye, LP=Limber pine/bitterbrush, DF=Douglas-fir, UQA=Upland quaking aspen, RZ=Riparian zone

Table 6. Percent cover by herbaceous plant growth form, herbaceous production, plant litter and plant interspace in major plant communities in Craters of the Moon National Monument to assist in quantifying fire effects. (Data collected on site by Park Personnel).

Vegetation type	Annual forb	Plant coverage (%)		Desirables/spp.		Interspace		(%)
		Peren. forb	Annual grass	Peren. grass	Total cover	(kg/ha)	Herb. Litter	
MB	1	5	1	8	15	410	1136	16
TT	-	23	-	37	60	1040	800	6
LS	1	19	-	11	30	480	360	28
AB	1	3	1	9	14	280	1626	13
GBW	2	1	-	72	75	4040	11160	1
LP	1	2	1	4	8	115	2226	21
DF	-	3	-	18	21	160	5600	6
UQA	1	6	-	19	26	360	5680	4
RZ	4	20	5	5	30	850	7200	2

MBS=Mountain big sagebrush, TTS=Three-tip sagebrush, LS=Low sagebrush, AB=Antelope bitterbrush, GBW=Great Basin wildrye, LP=Limber pine/bitterbrush, DF=Douglas-fir, UQA=Upland quaking aspen, RZ=Riparian zone. Desirable spp. within the interspaces represent available spp. to respond favorably to fire, usually 18% to 23% or greater of total cover.

Table 7. Mean shrub canopy coverage (cc, %) and height (ht, cm) from sample plots on Craters of the Moon National Monument (Data collected on site by Park Personnel).

Species	Vegetation Type								
	MBS	TTS	LS	AB	GBW	LP	DF	UQA	RZ
AMUT cc	-	-	-	-	-	-	3	1	1
ht	-	-	-	-	-	-	90	65	70
ARAR cc	0.3	2.5	20	-	-	-	-	-	-
ht	30	10	12	-	-	-	-	-	-
ARTRV cc	17	5	-	5	-	11	-	4	1
ht	56	-	-	52	-	61	-	40	45
ARTRI cc	-	13	-	-	-	-	-	-	-
ht	-	30	-	-	-	-	-	-	-
CHNA cc	6	-	-	14	-	6	-	2	1
ht	60	-	-	58	-	51	-	-	60
CHVI cc	5	-	3	-	-	-	-	2	-
ht	30	-	21	-	-	-	-	-	-
LEPU cc	3	-	-	-	-	2	-	-	-
ht	20	-	-	-	-	14	-	-	-
PRVI cc	0.3	-	-	-	-	0.3	4	-	8
ht	20	-	-	-	-	15	62	-	95
PUTR cc	11	-	-	37	-	24	-	5	1
ht	51	-	-	50	-	41	-	30	40
RIAU cc	0.5	-	-	-	-	-	-	-	2
ht	30	-	-	-	-	-	-	-	35
RICE cc	1.3	-	-	9	-	8	-	5	-
ht	60	-	-	56	-	48	-	-	-
SYOR cc	7.2	-	-	-	-	2	13	9	2
ht	37	-	-	-	-	49	57	27	52
TECA cc	1.8	-	-	-	-	-	-	-	-
ht	30	-	-	-	-	-	-	-	-
TOTAL cc	53.7	20.9	22.5	64.7	-	53.3	20.7	27.3	16.0
AVG. ht	39	20	17	54	-	40	70	41	57

MBS=Mountain big sagebrush, TTS=Three-tip sagebrush, LS=Low sagebrush, AB=Antelope bitterbrush, GBW=Great Basin wildrye, LP=Limber pine/bitterbrush, DF=Douglas-fir, UQA=Upland quaking aspen, RZ=Riparian zone

AMUT-serviceberry, ARAR-low sagebrush, ARTRV-mountain big sagebrush, ARTRI-three-tip sagebrush, CHNA-rubber rabbitbrush, CHVI-low rabbitbrush, LEPU-prickly phlox, PRVI-chokecherry, PUTR- bitterbrush, RIAU-golden currant, RICE-squaw currant, SYOR-snowberry, TECA-gray horsebrush.

Table 8. Example of fuel and weather input for utilizing PC/BEHAVE fire behavior program. (Information collected from field measurements at time of fire).

Dominant fuel type	SAGEBRUSH-BIG
Cover of dominant fuel type	85%
Secondary fuel type	SAGEBRUSH-LOW
1-Hr fuel moisture	8%
10-Hr fuel moisture	7%
100-Hr fuel moisture	8%
Herbaceous moisture	100%
Live woody moisture	150%
Midflame windspeed	8 mi/hr
Terrain slope	25.0%
Wind direction	0 degrees
Spread in maximum direction? Yes	

Table 9. Predicted fire behavior in mountain big sagebrush (85%) and low sagebrush vegetation when burning under the conditions specified in Table 10 when using PC/BEHAVE.

Fuel model: SAGEBRUSH-BIG (85%)

Rate-of-spread	4.0 chain/hr
Heat per unit area	206.5 Btu/sqft
Fireline intensity	15.0 Btu/ft/sec
Flame length	1.6 ft
Reaction intensity	797.6 Btu/sqft/m
Effective windspeed	8.2 mi/hr

Fuel model: SAGEBRUSH-LOW (15%)

Rate-of-spread	0.2 chain/hr
Heat per unit area	60.9 Btu/sqft
Fireline intensity	0.2 Btu/ft/sec
Flame length	0.2 ft
Reaction intensity	235.4 Btu/sqft/m
Effective windspeed	2.4 mi/hr

Weighted rate of spread between:

Fuel model: SAGEBRUSH-BIG (85%)

Fuel model: SAGEBRUSH-LOW (15%)

Appendix F

Vegetation Type Descriptions

Mountain Big Sagebrush

Mountain big sagebrush, in combination with several species of grasses which dominate the understory, is the most widespread of all vegetation types found on the monument, comprising 63% of the vegetated area. North of the highway, it occurs with bluebunch wheatgrass, Sandberg bluegrass, downy brome, bottlebrush squirreltail, and antelope bitterbrush. There, its occurrence is highly variable with respect to slope, aspect, and elevation. Idaho fescue is found on loess soils but does not occupy sites developed from recent cinder material.

Mountain big sagebrush intermixed with rubber rabbitbrush and green rabbitbrush with an understory of Sandberg bluegrass and the needlegrasses are prevalent in the southern portions of the monument, particularly in the Little Prairie area, around Echo Crater, and on Carey Kipuka. In the latter area it is often mixed with Idaho fescue and junegrass. In many areas in the southern portion of the monument, the mountain big sagebrush is a common associate in limber pine communities.

Of the sagebrush species, mountain big sagebrush is one of the best adapted to fire. It establishes readily following fire. Its seeds germinate more readily following a heat treatment than if untreated (Chaplin and Winward 1982). The plants grow rapidly and reach reproductive maturity within 3 to 5 years. Sagebrush may return to preburn levels within 15 to 20 years if sagebrush seedlings successfully establish the first year. If not, it may require 30 to 50 years for sagebrush to fully occupy the site (Blaisdell et al. 1982, Bunting et al. 1987). Observation of past burned sites on the monument indicate that sagebrush probably takes longer to return to preburn levels on the young cinder soils. There, we estimate that more than 75 years are required for the sagebrush to reoccupy the site.

Herbaceous productivity normally increases following fire in mountain big sagebrush vegetation (Harniss and Murray 1978, Uresk et al. 1980, Tisdale and Hironaka 1981, Johnson and Strang 1983, Blaisdell et al. 1984). Most perennial grass species such as bluebunch wheatgrass, bottlebrush squirreltail, Indian ricegrass, Great Basin wildrye and western needlegrass are well adapted to withstand fire. Productivity may be reduced the first year following fire if the fire was severe. Herbaceous productivity will remain at higher levels until the shrubs re-establish on the site. Initially forbs will dominate the site following fire (Kuntz 1982). Perennial grasses will gradually increase and dominate. If substantial perennial grass exists on the site at the time of the fire, forbs may dominate for only 1 or 2 years. At lower elevations and on more xeric sites, annual grasses such as cheatgrass may initially dominate if post-burn coverage of perennials is low. This could occur in sagebrush communities on cinder derived soils because these soils are more xeric than most typical soils of this vegetation zone. There are few native annual grasses common to this zone, however, annual forbs such as blue-eyed Mary, slenderleaf collomia, cryptantha, mentzelia and monkey flower may also increase greatly during this period until perennials dominate the burned site. Annuals may dominate the site for 5 to 10 years following the fire.

If these communities are not burned periodically, sagebrush cover will continue to increase. Potential cover of mountain big sagebrush may exceed 40%, which is greater than most other sagebrushes of the *Artemisia* zone (Bunting et al. 1987). Increasing sagebrush cover will suppress the herbaceous productivity in the understory. In particular, many of the forbs will be diminished and may disappear from the site. Some of these species may remain on the site through seeds stored in the soil seedbank. Severity of fires in dense old sagebrush is greater than those in stands of low sagebrush cover. This increases the direct impact of the fire on the herbaceous species and reduces

the number of viable seeds stored in the soil.

Diversity of the community is probably greatest within a few years post-burn and gradually declines as the sagebrush stand develops. The increase in diversity is caused by the temporary increase in forbs within the community. Some grasses such as western needlegrass may also increase rapidly during the initial years after the fire.

Antelope bitterbrush is common within this vegetation type and may be greatly reduced in density by the fire. Bitterbrush density is reduced 50% on the average but variation between stands is high (Bunting et al. 1985). Murray (1983) found that in eastern Idaho, bitterbrush would remain below preburn levels for over 30 years. It appears from observations of old burns on the monument that bitterbrush may recover more rapidly than sagebrush on the cinder soils. An area near Coyote Butte was burned by a wildfire in the 1940s. Bitterbrush has repopulated the site but mountain big sagebrush is still absent. It is likely that bitterbrush can tolerate these infertile harsh sites better than sagebrush. Bitterbrush is often observed as one of the pioneer plants that invade onto new road cuts and other severely disturbed sites.

Three-tip Sagebrush

Three-tip sagebrush vegetation types occur primarily on the Carey Kipuka and on areas north of the highway. In the north it is found on northeast slopes of Little Cottonwood Canyon. Idaho fescue is a co-dominant in this type. Bluebunch wheatgrass and Hoods phlox occur less frequently in this type.

Three-tip sagebrush has been reported to sprout following fire (Pechanec et al. 1965, Morris et al. 1976). The ability to resprout varies, however, which indicates that several ecotypes exist (Hironaka et al. 1983). Our experience with the populations of three-tip sagebrush in the CRMO region has shown that it has only moderate resprouting potential and that reduction in abundance of the species usually occurs following fire. The herbaceous plants such as bluebunch wheatgrass, western needlegrass and Idaho fescue will gradually increase in density when the canopy of the sagebrush is opened. Recovery of the sagebrush stand will probably take 25-40 years to reach preburn levels. If few perennial grasses are present prior to the fire, cheatgrass may invade the site following disturbance (Hironaka et al. 1983).

Without periodic fire, three-tip sagebrush will gradually increase in density and cover. It appears that maximum coverage for the species is approximately 25 to 30% (Daubenmire 1970, Bunting et al. 1987). Productivity of the herbaceous component will be suppressed by the relatively high coverage of the sagebrush.

Low Sagebrush Communities

Low sagebrush occurs exclusively north of the highway. It is typically found on bare ridgetops on either side of Little Cottonwood Canyon. The herbaceous component is usually diverse but sparse. Due to low productivity, these sites are difficult to burn and may sometimes be used as firebreaks. Care must be taken in years with greater than average production when these communities may be capable of carrying a fire (Bunting et al. 1987).

Sandberg bluegrass is usually abundant with stonecrop and Hoods phlox in lesser quantities. A small amount of low sagebrush with an understory of Idaho fescue, Hoods phlox and bluebunch wheatgrass is found in the extreme northwest corner of the monument on northwest facing slopes.

Low sagebrush does not resprout and is easily killed by fire. Sagebrush cover does not tend to increase greatly in the absence of fire and is normally less than 13% at CRMO. Recovery of low sagebrush following fire is slow and may require 25-50 years to reach preburn levels.

Antelope Bitterbrush

Plant communities dominated by antelope bitterbrush are well distributed throughout the central portions of the monument. Major occurrences of this type can be found in the vicinity of Big Cinder Butte. In most locations it is associated with young cinder substrates and is one of the initial species to occupy this material. Generally the dominant, antelope bitterbrush is associated with considerable amounts of rubber rabbitbrush. In areas where succession is more advanced, mountain big sagebrush and wax current are important associates. Bluebunch wheatgrass, downy brome, Indian ricegrass and several forbs make up the understory. In some distinct but widely scattered areas, Great Basin wildrye and bluebunch wheatgrass share dominance in the understory.

Bitterbrush rapidly occupies sites following a disturbance. This ability to tolerate bare sites is one of the factors allowing it to be a pioneer species on the cinder substrates. Bitterbrush has re-established more rapidly than sagebrush following the fire that occurred in the 1940's on Coyote Butte. On heavier soils, mountain big sagebrush would probably re-establish with bitterbrush.

Bitterbrush is not shade tolerant and will often decline in a stand as the canopy of trees develops. This may be a factor for long-term bitterbrush productivity on sites where Douglas-fir or limber pine stands are developing. The stands of decadent bitterbrush on Grassy and Big Cinder Buttes are probably declining as a result of conifer overstory closure.

Bitterbrush is a relatively short-lived plant. McConnell and Smith (1977) found that biomass productivity declined in Oregon high desert populations after approximately 70 years. We have noted similar declines in populations on the southern Boise National Forest. This indicates that conditions for adequate seedling establishment must be frequently met to maintain vigorous populations. Without periodic disturbance, we predict that bitterbrush not associated with limber pine would decline in seed and biomass production but would remain in the community. Those bitterbrush stands associated with limber pine would be affected by the degree of tree canopy closure. Probably only those in the high density limber pine stands would be reduced.

Populations of bitterbrush associated with mountain big sagebrush are reasonably well adapted to periodic fire (Bunting et al. 1985). They are normally of the decumbent growth form which resprouts well. Resprouting of bitterbrush averaged 45% in nonforested communities where mountain big sagebrush was present. Moderate seedling establishment occurs on these sites and it is expected that bitterbrush populations would recover within 10 to 20 years following fire.

Great Basin Wildrye

This community is restricted to two areas north of the highway, one at the mouth of Little Cottonwood Canyon and a second just north of the group campground. Great Basin wildrye is the dominant plant species in both areas. Mountain big sagebrush and rubber rabbitbrush are found in limited quantities along the margins of this community but do not occupy the community. The shrubs are probably restricted by the high water content of the soil during the spring period. Stickseed,

tumble mustard, and field pennycress are found on disturbed areas within this type. Small amounts of Canada thistle are found adjacent to Little Cottonwood Creek. These forb species tend to behave as weeds (tumble mustard, field pennycress and Canada thistle are also exotics) and would increase temporarily following fire.

The wildrye community is productive and appears to be maintaining itself. The major environmental factor determining its development as a community is the periodic moisture saturated soil. Wildrye is well adapted to fire and annual biomass production would probably increase following a fire for several years. There is no evidence, however, that the current community is dependent upon fire for maintenance. Fire would control the big sagebrush at the community boundary but sagebrush encroachment is limited by the saturated soil.

Canada thistle would increase in the community following fire. Its rhizomatous rootsystem and aggressive seedlings would make it possible for this species to rapidly occupy the plant interspaces created by the fire. Once established the thistle would likely remain in the newly occupied area. Therefore, fire would only serve to spread thistle.

Limber Pine-Bitterbrush

Day and Wright (1985) defined three separate limber pine/antelope bitterbrush communities based on the density and cover of the limber pine. In each type, limber pine dominates the landscape. The distribution of limber pine is probably heavily influenced by seed caching activity of Clark's nutcracker. Reproduction of whitebark pine is nearly completely dependent upon Clark's nutcracker (Lanner 1980). The reproduction of limber pine has a similar dependence on the birds.

Low cover limber pine/antelope bitterbrush stands are found on the older block lava flows. These are typical in the Devil's Orchard area and in the vicinity of the Sentinel. The understory is variable but is primarily composed of rubber rabbitbrush, antelope bitterbrush and lava phlox.

High cover limber pine/bitterbrush stands tend to occur in association with cinder and older pahoehoe lava flows on many areas of the monument south of the highway. Antelope bitterbrush and mountain big sagebrush are co-dominant shrubs in these stands, with rubber rabbitbrush a frequent associate. All 3 of these shrub species are shade intolerant but can persist in the stand at the densities which limber pine achieves. At high tree density such as on the north slope of Grassy Cone, these shrubs will begin to decline on the site. Grasses include Sandberg bluegrass, bottlebrush squirreltail and occasionally Indian ricegrass. These grass species are also shade intolerant and will decline under conditions of high tree density. Limber pine is also shade intolerant but densities which interfere with reproduction are seldom achieved on CRMO.

Selected locations in the central and southern portions of the monument support very high densities of limber pine (up to 456 trees/ha). Usually these sites are on the northeast slopes of older cinder cones. The shrub component is similar to the other limber pine types, but herbaceous production and cover are lower.

Substantial numbers of mature limber pine on the monument were removed or poisoned in the mid-1960s in order to "control" a dwarf mistletoe outbreak. Despite this loss, the number of limber pine trees appears to be increasing on many sites throughout the monument (Table 3). The increase appears to have been most rapid during recent years as the mean annual density change has been 3.8% since 1961. This increase has resulted in spite of over 6000 trees being killed during the dwarf

mistletoe control program.

The increase in limber pine is consistent with observed changes in the distribution of other conifers throughout the region (Franklin et al. 1971, Koterba and Habeck 1971, Vale 1981, Arno and Gruell 1983, Butler 1986). This has been attributed to an number of factors including fire suppression, grazing by domestic livestock and climatic variation. At CRMO the influence of the former 2 factors has been minimal, suggesting that climatic variation is the predominant factor involved. This is confounded by the primary succession occurring on the monument. Successional changes may be occurring more rapidly than formerly expected. The cause of the increase is probably "natural" and not human induced, and therefore, no management action is required to rectify the situation.

The occurrence of fire would set succession back and reduce the abundance of both limber pine, sagebrush and bitterbrush. If rubber rabbitbrush was abundant at the time of the fire, it would probably then dominate the site. If rabbitbrush were not present, then grasses would probably dominate until the shrubs and limber pine became re-established. It would probably require 50-100 years for the shrubs to dominate and over 100 years for the limber pine to re-establish on the site. The establishment rate for limber pine is not well documented, however. Data indicate that it requires over 50 years for whitebark pine to become re-established following fire and then up to 100 additional years for the individual to reach maturity (Morgan and Bunting Unpublished data). Whitebark pine has many similar site requirements to limber pine and is also dependent upon the Clark's nutcracker for reproduction (Lanner 1980).

Table 3. Change in limber pine density at Craters of the Moon National Monument from 1922 to 1986 based on paired photographs (Wright and Bunting Unpublished data).

Years	Interval length (yr)	Percent change (Range)	Annual change (Range)	Mean annual change (%)
1961-1986	25	21 - 244	0.84 - 11.64	3.8
1955-1986	31	-10 - 85	-0.34 - 2.94	1.1
1922-1986	64	-8 - 160	-0.13 - 3.08	1.3

Douglas-fir

This type is found in three discrete areas, Grassy Cone, Sunset Cone, and in the upper portions of Little Cottonwood Canyon. The stand on Grassy Cone is on a more xeric site with cinder substrate. Mountain snowberry is the dominant understory shrub and antelope bitterbrush and rubber rabbitbrush are common in certain locations. Chokecherry is frequent in restricted areas. The herbaceous understory is sparse and includes arrowleaf balsamroot, bluebunch wheatgrass, Sandberg bluegrass, and desert parsley. The Sunset Cone stand is also a xeric site. The substrate is also cinder, but mixed with a more coarse aggregate. The shrub and understory components are sparse in this stand as well. Sandberg bluegrass, antelope bitterbrush and cinquefoil occur infrequently. Scattered aspen are also present.

A Douglas-fir stand, more typical of those found in central Idaho, is located in upper Little Cottonwood Canyon. This stand appears to be quite viable with numerous young trees. The

understory dominant, mountain snowberry, is much more prevalent than in the preceeding stands. Other understory species such as nettleleaf, slender wheatgrass, and starry solomonplume indicate a more moist environment. In all of the Douglas-fir stands, understory cover is reduced due to wildlife use. These stands are a favored mule deer foraging and resting area, particularly in late summer and early fall.

Based on photographic evidence, the Douglas-fir stands have increased both in density and in area by spreading into adjacent sagebrush grasslands over the past 50 to 75 years. The increase in Douglas-fir is consistent with the results found by other researchers in the region (Patton 1969, Sindelar 1971, Arno and Gruell 1982, Gruell et al. 1986). The stand in Little Cottonwood Canyon has invaded into adjacent sagebrush-grass and aspen vegetation types. The development of a coniferous overstory alters the understory significantly as shade-tolerant species become more abundant. Eventually most species found in the sagebrush-grass and the aspen stands will be lost from the community. The effects of conversion to Douglas-fir have been described by Gruell et al. (1986).

The primary cause of the regional increase in Douglas-fir is thought to be fire suppression which allows the young seedlings to become established in the adjacent communities (Houston 1973, Arno 1980). This is also probably the case for Little Cottonwood Canyon and Grassy Cone. Fire scars can be found on the older Douglas-fir trees in Little Cottonwood Canyon. It appears from dates on these trees that the last major fire in this drainage occurred over 100 years ago. Lavas and cinders from recent volcanic activity at the mouth of the canyon would have prevented fires from sweeping out of the valleys and up the canyon. Thus, fire was probably not as prevalent here as in many similar canyons out of the monument and they would tend to be less extensive with local ignitions.

Fire within this type would reduce the abundance of Douglas-fir and increase the abundance of shade intolerant shrub species such as sagebrush and bitterbrush. Low intensity fires would primarily effect the young trees and saplings leaving the mature trees as a seed source for regeneration. High intensity fires could potentially kill most Douglas fir within the stand. The recovery period would then be substantially longer and it may require several hundred years for the site to recover to the preburn conditions.

Upland Quaking Aspen

The majority of the aspen on the monument is located north of the highway. However, scattered stands occur in the central and southern portions of the monument on Big Cinder Butte, Fissure Butte, and small areas within the Silent Cone flow. In each, quaking aspen is the dominant species. Woods rose, chokecherry, antelope bitterbrush and mountain big sagebrush are common associates. Fireweed grass, bluebunch wheatgrass, slender wheatgrass and mountain brome grass are the most abundant grass species in this type.

Like the limber pine and Douglas-fir, the aspen stands on the northern portion of the monument have increased in area substantially in the past 50 years (Wright and Bunting, unpublished data). In many areas the understory cover has been heavily depleted by mule deer which use the stands for shade and resting cover in summer and early fall.

In the absence of fire, aspen will tend to invade into adjacent sagebrush grassland vegetation (Loope and Gruell 1973). Older stands on northern aspects will be invaded themselves by Douglas-fir if a seed source is available. Fire in aspen stands will invigorate the stand by inducing resprouting and controlling competing vegetation. Non-resprouting species such as conifers will be temporarily

removed from the stand. Lack of fire in the stands invaded by Douglas-fir will result in a conversion of this type to a Douglas-fir forest and eventual loss of the aspen. In stands which are not invaded by conifers, the situation is less clear. Some researchers consider the aspen to be climax on these sites (Langenheim 1962, Reed 1971). Many aspen stands will deteriorate in time if not invigorated by fire and will revert back to grassland or sagebrush grassland (Krebill 1972, Schier 1975, DeByle 1976, DeByle and Winokur 1985). It is not clear which will happen at CRMO but there is no evidence at this time of aspen stand deterioration.

Riparian Zone

Two small zones of riparian vegetation are found in the northern portions of the monument along the drainages of Little Cottonwood Creek and Leach Creek. Both areas are comprised of dense woody vegetation and an understory of dense tall forbs. The dominant tree species include quaking aspen, cottonwood, chokecherry, alder, and willow. The forb layer is comprised primarily of cow parsnip, big-sting nettle (both exotics), and small-leaf angelica.

Little information is available on the effects of fire or lack of fire on riparian systems. Most of the overstory shrub species resprout vigorously following fire and most understory species can probably survive infrequent fires of low intensity. Fire would tend to remove Douglas-fir from riparian zones but Douglas-fir probably would not become a dominant in any case because it is best adapted to upland, well drained sites. Riparian sites can accumulate substantial amounts of dead wood in the shrub canopies and on the soil surface. This is particularly true for those dominated by willows. Periodic fire probably would maintain the shrubs in a more healthy and productive condition if fires did not occur too frequently. There is no evidence to indicate that fire is necessary to maintain the vegetation type in this area.

If fires occurred too frequently in riparian systems, the stream course would begin to straighten and water flow would accelerate. Debris dams and overhanging banks would be reduced. Water quality would probably decline due to increased sediment loads. Riparian zones are disproportionately important to wildlife species as compared to the area of upland vegetation (Ames 1977, Thomas 1979, Wright and Hoffman Unpublished data from CRMO). Frequent fires within these types would greatly change the structure of the plant community, reducing the tree and shrub component and thereby reduce the habitat value for wildlife.

Appendix G.

List of species (scientific and common names) used in the text.

Scientific Name	Common name
<u>Agastache urticifolia</u>	Nettle-leaf horsemint
<u>Agropyron spicatum</u>	bluebunch wheatgrass
<u>Agropyron trachycaulum</u>	slender wheatgrass
<u>Allium simillimum</u>	dwarf onion
<u>Alnus incana</u>	mountain alder
<u>Amelanchier alnifolia</u>	Saskatoon serviceberry
<u>Angelica pinnata</u>	small-leaf angelica
<u>Antennaria stenophyllus</u>	narrow-leaf pussy-toes
<u>Aquilegia formosa</u>	Sitka columbine
<u>Arabis holboellii</u>	Holboell rockcress
<u>Artemisia arbuscula</u>	cow sagebrush
<u>A. longiloba</u>	early low sagebrush
<u>A. tridentata</u>	
ssp. <u>tridentata</u>	big sagebrush
<u>A. tridentata</u>	
ssp. <u>vaseyana</u>	mountain big sagebrush
<u>A. tripartita</u>	three-tip sagebrush
<u>A. tripartita</u>	
var. <u>rupicola</u>	
<u>Aster canescens</u>	hoary aster
<u>Balsamorhiza sagittata</u>	arrowleaf balsamroot
<u>Betula glandulosa</u>	bog birch
<u>Bromus tectorum</u>	cheatgrass
<u>Calamagrotis koeleriodes</u>	fire reedgrass
<u>Calyptidium roseum</u>	rosy calyptidium
<u>Capsella bursa-pastoris</u>	shepherd's purse
<u>Castilleja miniata</u>	scarlet painted-cup
<u>Ceanothus velutinus</u>	sticky laurel
<u>Chaenactis douglasii</u>	Douglas chaenactis
<u>Chamaebatiaria millefolium</u> t	Tansybush
<u>Chrysothamnus nauseosus</u>	rubber rabbitbrush
<u>C. viscidiflorus</u>	green rabbitbrush
<u>Cirsium</u> spp.	thistle
<u>Crepis acuminata</u>	taper-tip hawksbeard
<u>Cryptantha interrupta</u>	bristly cryptantha
<u>Cymopterus terebinthinus</u>	desert parsley
<u>Ceanothus velutinus</u>	snowbrush
<u>Delphinium andersonii</u>	Anderson larkspur
<u>Elymus cinereus</u>	great basin wildrye
<u>Erigeron compositus</u>	fernleaf fleabane
<u>Eriogonum caespitosum</u>	mat eriogonum
<u>E. heracleoides</u>	Wyeth eriogonum
<u>E. microthecum</u>	slenderbrush eriogonum
<u>E. ovalifolium</u>	
var. <u>depressum</u>	dwarf buckwheat
<u>E. umbellatum</u>	sulfur buckwheat

<u>Festuca idahoensis</u>	Idaho fescue
<u>Gayophytum decipiens</u>	deceptive groundsmoke
<u>Geranium viscosissimum</u>	sticky purple geranium
<u>Haplopappus nanus</u>	dwarf goldenweed
<u>H. acaulis</u>	stemless goldenweed
<u>Helianthella uniflora</u>	coneflower helianthella
<u>Heracleum lanatum</u>	cow parsnip
<u>Holodiscus spp.</u>	ocean spray
<u>Koeleria nitida</u>	prairie junegrass
<u>Lappula redowskii</u>	western stickseed
<u>Leptodactylon pungens</u>	lava phlox
<u>Leucopoa kingii</u>	spikegrass
<u>Lewisia rediviva</u>	bitterroot Lewisia
<u>Lithospermum ruderales</u>	stoneseed
<u>Lupinus argenteus</u>	silvery lupine
<u>Lygodesmia spinosa</u>	thorn skeleton plant
<u>Melica bulbosa</u>	onion grass
<u>Mentzelia albicaulis</u>	whitestem mentzelia
<u>Mertensia ciliata</u>	broadleaf bluebell
<u>Mimulus nanus</u>	dwarf monkeyflower
<u>M. suksdorfii</u>	Suksdorf's mimulus
<u>Oryzopsis hymenoides</u>	Indian ricegrass
<u>Oxytropis lagopus</u>	rabbit-food crazyweed
<u>Penstemon deustus</u>	scabland penstemon
<u>Phacelia hastata</u>	silverleaf phacelia
<u>Philadelphus lewisii</u>	mockorange
<u>Phlox hoodii</u>	Hood's phlox
<u>Pinus flexilis</u>	limber pine
<u>Poa pratensis</u>	Kentucky bluegrass
<u>P. sandbergii</u>	Sandberg bluegrass
<u>Populus tremuloides</u>	quaking aspen
<u>P. trichocarpa</u>	black cottonwood
<u>Potentilla glandulosa</u>	sticky cinquefoil
<u>Prunus virginiana</u>	common chokecherry
<u>Pseudotsuga menziesii</u>	Douglas-fir
<u>Purshia tridentata</u>	antelope bitterbrush
<u>Ribes cereum</u>	wax current
<u>Rudbeckia occidentalis</u>	blackhead coneflower
<u>Salix spp.</u>	willow
<u>Sedum stenopetalum</u>	stonecrop
<u>Sitanion hystrix</u>	squirrel tail
<u>Stephanomeria tenuifolia</u>	narrowlaved. skeletonweed
<u>Stipa occidentalis</u>	
var. <u>nelsonii</u>	Nelson's needlegrass
<u>S. comata</u>	needle-and-thread
<u>S. thurberiana</u>	Thurber needlegrass
<u>X Stiporyzopsis bloomeri</u>	
<u>Symphoricarpos oreophilus</u>	mountain snowberry
<u>Tetradymia canescens</u>	gray horsebrush
<u>Urtica dioica</u>	bigsting nettle
<u>Valeriana acutiloba</u>	sharpleaf valerian

Appendix H

Definitions

Appropriate Management Response - Specific actions taken in response to a wildland fire to implement protection and fire use objectives. This term is a new term that does not replace any previously used term.

Daily revalidation – A process named the periodic fire assessment, which evaluates the continued capability of the local unit to manage the fire for resource benefits, and to determine if the fire is escalating in complexity and operational needs. This process is completed as frequently as specified by the local unit.

Decision Criteria Checklist (Initial Go/No-Go Decision) – A set of standards evaluation criteria to determine if the current wildland fire meets criteria to be managed for resource benefits. The completion of these criteria will lead to a decision to “Go/Not-Go” with management of the fire for resource benefits.

Expected Weather Conditions - those weather conditions indicated as common, likely, or highly probable based on current and expected trends and their comparison to historical weather records. These are the most probable weather conditions for this location and time. These conditions are used in making fire behavior forecasts for different scenarios (one necessary scenario involves fire behavior prediction under "expected weather conditions").

Experienced Severe Weather Conditions - those weather conditions that occur infrequently, but have been experienced on the fire site area during the period of weather records. For example, rare event weather conditions that significantly influence fires may have occurred only once, but their record can be used to establish a baseline for a worst-case scenario. These are the most severe conditions that can be expected. These conditions are used in making fire behavior forecasts for different scenarios (one necessary scenario involves fire behavior prediction under "experienced severe weather conditions").

Fire Complexity Analysis – A process for assessing wildland fire organizational needs and relative complexity in terms of ICS types (I, II, III etc.).

Fire Management Areas (FMA) - a sub-geographic area within an FMU that represents a pre-defined ultimate acceptable management area for a fire managed for resource benefits. This pre-defined area can constitute a Maximum Manageable Area (MMA) and is useful for those units having light fuel types conducive to very rapid fire spread rates. Pre-definition of these areas removes the time-lag in defining an MMA after ignition and permits pre-planning of the fire area, identification of threats to life, property, resources, and boundaries, and identification of initial actions.

Fire Management Plan (FMP) - A strategic plan that defines a program to manage wildland and prescribed fires and documents the Fire Management Program in the approved land use plan. The plan is supplemented by operational plans such as preparedness plans, preplanned dispatch plans, prescribed fire plans and prevention plans.

Fire Management Unit (FMU) - any land management area definable by objectives, topographic features, access, values-to-be-protected, political boundaries, fuel types, or major fire regimes, etc., that sets it apart from management characteristics of an adjacent unit. FMUs are delineated in Fire Management Plans (FMP). These units may have dominant management objectives and pre-selected strategies assigned to accomplish these objectives.

Holding Actions - planned actions required to achieve wildland and prescribed fire management objectives. These actions have specific implementation timeframes for fire use actions but can have less sensitive implementation demands for suppression actions. For wildland fires managed for resource benefits, an MMA may not be totally naturally defensible. Specific holding actions are developed to preclude fire from exceeding the MMA. For prescribed fires, these actions are developed to restrict the fire inside the planned burn unit. For suppression actions, holding actions may be implemented to prohibit the fire from crossing containment boundaries. These actions may be implemented as firelines are established to limit the spread of fire.

Initial Attack - An aggressive suppression action consistent with firefighter and public safety and values to be protected.

Management Action Points - also called "trigger points." Either geographic points on the ground or specific points in time where an escalation or alteration of management actions is warranted.

These points are defined and the management actions to be taken are clearly described in an approved Wildland Fire Implementation Plan (WFIP) or Prescribed Fire Plan. Timely implementation of the actions when the fire reaches the action point is generally critical to successful accomplishment of the objectives.

Maximum Manageable Area (MMA) - MMA defines the firm limits of management capability to accommodate the social, political, and resource impacts of a wildland fire. Once established as part of an approved plan, the general impact area is fixed and not subject to change. MMAs can be developed as part of the FMP and described as a FMA. They can also be developed as part of the planning and implementation of management actions after a fire has ignited. If they are developed after the ignition, their definition will occur during the Wildland Fire Implementation Plan Stage III process. In the event a fire occurs in a pre-planned MMA or FMA and the local unit determines that this MMA is not the best-suited alternative for the present conditions, a new MMA can be developed as part of the Stage III process. Once this occurs, the Stage III MMA becomes the firm limits of the fire and is fixed.

Mitigation Actions - Mitigation actions are considered to be those on-the-ground activities that will serve to increase the defensibility of the MMA; check, direct, or delay the spread of fire; and minimize threats to life, property, and resources. Mitigation actions may include mechanical and physical non-fire tasks, specific fire applications, and limited suppression actions. These actions will be used to construct firelines, reduce excessive fuel concentrations, reduce vertical fuel continuity, create fuel breaks or barriers around critical or sensitive sites or resources, create "blacklines" through controlled burnouts, and to limit fire spread and behavior.

Normal Fire Year – The normal fire year for suppressed wildland fires is the year with the third highest number of wildland fires in the past ten years of record. The normal wildland fire managed for resource benefits year is the year with the third highest number of acres burned by wildland fire managed for resource benefits in the past ten years of record.

Preparedness - Activities that lead to a safe, efficient and cost effective fire management program in support of land and resource management objectives through appropriate planning and coordination. This term replaces presuppression.

Prescribed Fire - Any fire ignited by management actions to meet specific objectives. A written, approved prescribed fire plan must exist, and NEPA requirements must be met, prior to ignition. This term replaces management ignited prescribed fire.

Prescribed Fire Plan - a plan required for each fire application ignited by managers. It must be prepared by qualified personnel and approved by the appropriate Agency Administrator prior to implementation. Each plan will follow specific agency direction and must include critical elements described in agency manuals. Formats for plan development vary among agencies, although content is the same.

Prescription - Measurable criteria which define conditions under which a prescribed fire may be ignited, guide selection of appropriate management responses, and indicate other required actions. Prescription criteria may include safety, economic, public health, environmental, geographic, administrative, social or legal considerations.

Trigger points - see Management action points.

Wildfire - An unwanted wildland fire. **This term was only included to give continuing credence to the historic fire prevention products. This is NOT a separate type of fire.**

Wildland and Prescribed Fire Complexity Analysis – The formal process to determine the full complexity rating for wildland and prescribed fires. It utilizes 12 variables having numerically weighted importance combined with user identified complexity values.

Wildland Fire - Any non-structure fire, other than prescribed fire, that occurs in the wildland. This term encompasses fires previously called both wildfires and prescribed natural fires.

Wildland Fire Implementation Plan (WFIP) - A progressively developed assessment and operational management plan that documents the analysis and selection of strategies and describes the appropriate management response for a wildland fire. A full WFIP consists of three stages. Different levels of completion may occur for differing management strategies (i.e., fires managed for resource benefits will have two - three stages of the WFIP completed while some fires that receive a suppression response may only have a portion of Stage I completed).

Wildland Fire Management Program - The full range of activities and functions necessary for planning, preparedness, emergency suppression operations, and emergency rehabilitation of wildland fires, and prescribed fire operations, including non-activity fuels management to reduce risks to public safety and to restore and sustain ecosystem health.

Wildland Fire Situation Analysis (WFSA) -A decision-making process that evaluates alternative management strategies against selected safety, environmental, social, economic, political, and resource management objectives.

Wildland Fire Suppression - an appropriate management response to wildland fire that results in curtailment of fire spread and eliminates all identified threats from the particular fire. All wildland fire suppression activities provide for firefighter and public safety as the highest consideration, but minimize loss of resource values, economic expenditures, and/or the use of critical firefighting resources.

Wildland Fire Use - the management of naturally ignited wildland fires to accomplish specific pre-stated resource management objectives in pre-defined geographic areas outlined in Fire Management Plans. Operational management is described in the Wildland Fire Implementation Plan (WFIP). Wildland fire use is not to be confused with "fire use," which is a broader term encompassing more than just wildland fires (see definition below):

Fire Use - the combination of wildland fire use and prescribed fire application to meet resource objectives

Wildland Fire Assessment, Implementation, and Documentation Process

Wildland Fire Implementation Plan

Fire Name
Fire Number

Documentation Product

*Product Product
Needed Completed*

WFIP - Stage I: Initial Fire Assessment

Fire Situation

☐☐

Initial GO/NO-GO Decision

☐☐

WFIP - Stage II: Short-Term Implementation Actions

Short-Term Fire Behavior Predictions And Risk Assessment ☐

☐

Short-term Implementation Actions

☐☐

Complexity Analysis

☐☐

Stage III Need Assessment Chart

☐☐

WFIP - Stage III: Long-Term Implementation Actions ☐

☐

Periodic Fire Assessment

Part 1, Re-validation

☐☐

Part 2, Stage III Need Assessment

☐☐

Wildland Fire Situation Analysis

☐☐

FIRE SITUATION

Fire Name					
Fire Number					
Jurisdiction(s)					
Administrative Unit(s)					
FMP Unit(s)					
Geographic Area					
Management Code					
Start Date/Time					
Discovery Date/Time					
Current Date/Time					
Current Size					
Location:	Legal Description(s)	T.	R.	Sec.	Sub.
	Latitude				
	Longitude				
	UTM:				
	County:				
	Local Description				
Cause					

Wildland Fire Implementation Plan - Stage II

Fuel Model/
Conditions

Weather:

Current

Predicted

Fire Behavior:

Current

Predicted

Availability of
Resources

DECISION CRITERIA CHECKLIST

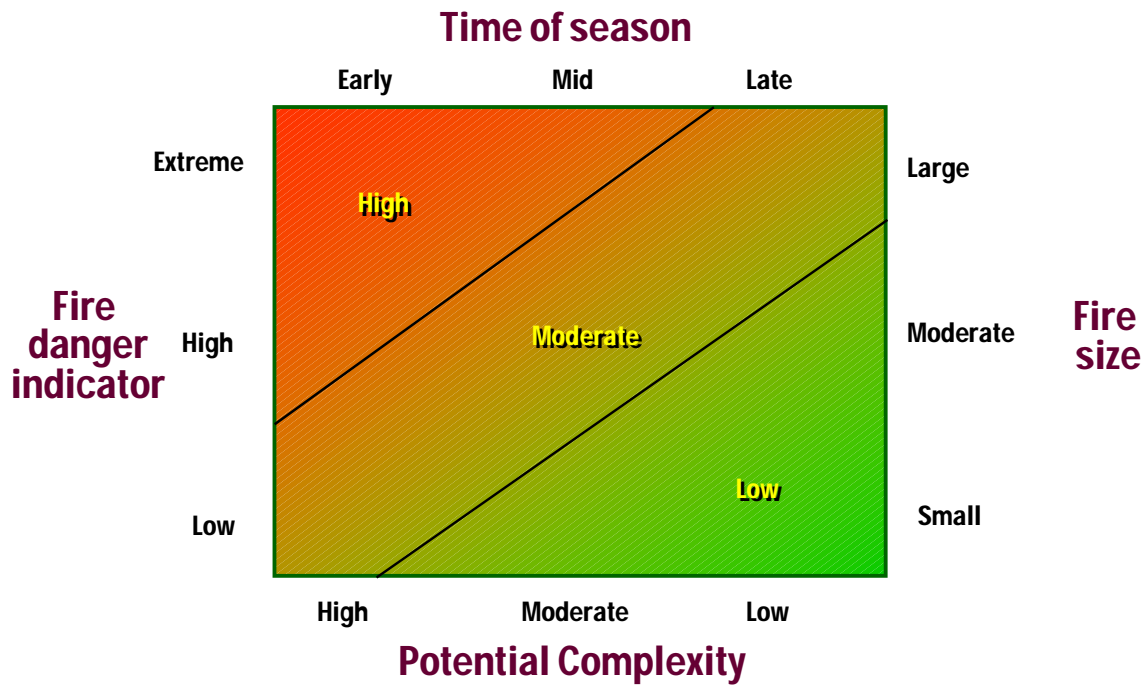
<i>Decision Element</i>	<i>Yes</i>	<i>No</i>
Is there a threat to life, property, or resources that cannot be mitigated?		
Are potential effects on cultural and natural resources outside the range of acceptable effects?		
Are relative risk indicators and/or risk assessment results unacceptable to the appropriate Agency Administrator?		
Is there other proximate fire activity that limits or precludes successful management of this fire?		
Are there other Agency Administrator issues that preclude wildland fire use?		

The Decision Criteria Checklist is a process to assess whether or not the situation warrants continued wildland fire use implementation. A "Yes" response to any element on the checklist indicates that the appropriate management response should be suppression-oriented.

Recommended Response Action (check appropriate box)	NO-GO (Initial attack/suppression action)	
	GO (Other appropriate management response)	

Signature _____ Date _____

Wildland Fire Relative Risk Rating



Determination of Relative Risk Rating for Wildland Fires. To obtain relative risk, connect lines between the top and bottom variables and the left and right hand variables. Where these lines cross represents the relative risk for this specific fire.

SHORT-TERM IMPLEMENTATION ACTION

Attach Stage I information.

<i>Action Items</i>	<i>Information specific to this fire</i>
Objectives and Desired Effects	
Safety Considerations	
External Concerns	
Environmental Concerns	

Wildland Fire Implementation Plan - Stage II

Threats

--

Short-Term Actions
(describe)

--

Estimated Costs

--

Signature

--

Title/date

--

WILDLAND AND PRESCRIBED FIRE COMPLEXITY RATING WORKSHEET

<i>Complexity element</i>	<i>Weighting factor</i>	<i>Complexity value</i>	<i>Total points</i>
Safety	5		
Threats to boundaries	5		
Fuels and fire behavior	5		
Objectives	4		
Management organization	4		
Improvements	3		
Natural, cultural, social values	3		
Air quality values	3		
Logistics	3		
Political concerns	2		
Tactical operations	2		
Interagency coordination	1		

Total complexity points

Complexity Rating (circle)

L

M

H

Complexity Value Breakpoints:

Low *40 - 90*

Moderate *91 - 140*

High *141 - 200*

The Wildland and Prescribed Fire Complexity Analysis provides a method to assess the complexity of both wildland and prescribed fires. The analysis incorporates an assigned numeric rating complexity value for specific complexity elements that are weighted in their contribution to overall complexity. The weighted value is multiplied times the numeric rating value to provide a value for that item. Then all values are added to generate the total complexity value. Breakpoint values are provided for low, moderate, and high complexity values.

The complexity analysis worksheet is accompanied by a guide to numeric values for each complexity element shown, provided on the following pages.

Wildland and Prescribed Fire Complexity Rating Worksheet Numeric Rating Guide

COMPLEXITY ELEMENT	GUIDE TO NUMERIC RATING		
	1	3	5
Safety	Safety issues are easily identifiable and mitigated	<ul style="list-style-type: none"> • Number of significant issues have been identified • All safety hazards have been identified on the LCES worksheet and mitigated 	<ul style="list-style-type: none"> • SOF1 or SOF2 required • Complex safety issues exist
Threats to Boundaries	<ul style="list-style-type: none"> • Low threat to boundaries • POI<50% • Boundaries naturally defensible 	<ul style="list-style-type: none"> • Moderate threat to boundaries • 50<POI<70% • Moderate risk of slopover or spot fires • Boundaries need mitigation actions for support to strengthen fuel breaks, lines, etc. 	<ul style="list-style-type: none"> • High threat to boundaries • POI>70% • High risk of slopover or spot fires • Mitigation actions necessary to compensate for continuous fuels
Fuels/Fire Behavior	<ul style="list-style-type: none"> • Low variability in slope & aspect • Weather uniform and predictable • Surface fuels (grass, needles) only • Grass/shrub, or early seral forest communities • Short duration fire • No drought indicated 	<ul style="list-style-type: none"> • Moderate variability in slope & aspect • Weather variable but predictable • Ladder fuels and torching • Fuel types/loads variable • Dense, tall shrub or mid-seral forest communities • Moderate duration fire • Drought index indicates normal conditions to moderate drought; expected to worsen 	<ul style="list-style-type: none"> • High variability in slope & aspect • Weather variable and difficult to predict • Extreme fire behavior • Fuel types/loads highly variable • Late seral forest communities or long-return interval fire regimes • Altered fire regime, hazardous fuel /stand density conditions • Potentially long duration fire • Drought index indicates severe drought; expected to continue

Wildland Fire Implementation Plan - Stage II

COMPLEXITY ELEMENT	GUIDE TO NUMERIC RATING		
	1	3	5
Objectives	<ul style="list-style-type: none"> • Maintenance objectives • Prescriptions broad • Easily achieved objectives 	<ul style="list-style-type: none"> • Restoration objectives • Reduction of both live and dead fuels • Moderate to substantial changes in two or more strata of vegetation • Objectives judged to be moderately hard to achieve • Objectives may require moderately intense fire behavior 	<ul style="list-style-type: none"> • Restoration objectives in altered fuel situations • Precise treatment of fuels and multiple ecological objectives • Major change in the structure of 2 or more vegetative strata • Conflicts between objectives and constraints • Requires a high intensity fire or a combination of fire intensities that is difficult to achieve
Management Organization	<ul style="list-style-type: none"> • Span of control held to 3 • Single resource incident or project 	<ul style="list-style-type: none"> • Span of control held to 4 • Multiple resource incident or project • Short-term commitment of specialized resources 	<ul style="list-style-type: none"> • Span of control greater than 4 • Multiple branch, divisions or groups • Specialized resources needed to accomplish objectives • Organized management team (FUMT, IMT)
Improvements to be Protected	<ul style="list-style-type: none"> • No risk to people or property within or adjacent to fire 	<ul style="list-style-type: none"> • Several values to be protected • Mitigation through planning and/or preparations is adequate • May require some commitment of specialized resources 	<ul style="list-style-type: none"> • Numerous values and/or high values to be protected • Severe damage likely without significant commitment of specialized resources with appropriate skill levels
Natural, Cultural, and Social Values to be Protected	<ul style="list-style-type: none"> • No risk to natural, cultural, and/or social resources within or adjacent to fire 	<ul style="list-style-type: none"> • Several values to be protected • Mitigation through planning and/or preparations is adequate • May require some commitment of specialized resources 	<ul style="list-style-type: none"> • Numerous values and/or high values to be protected • Severe damage likely without significant commitment of specialized resources with appropriate skill levels

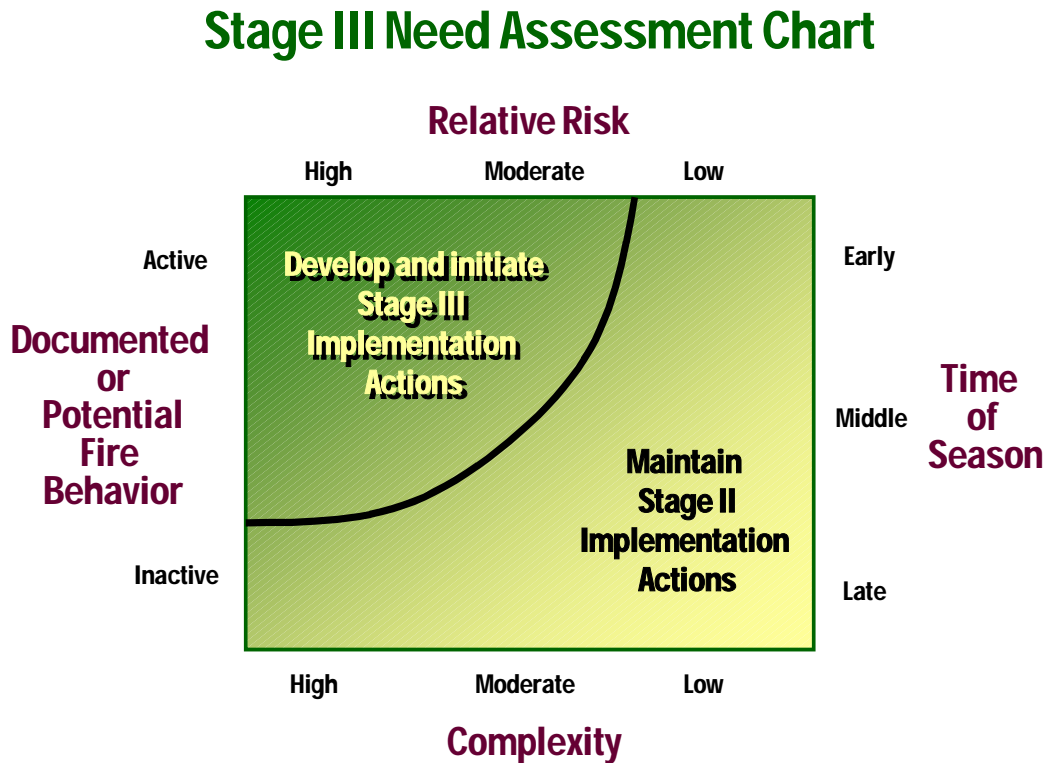
Wildland Fire Implementation Plan - Stage II

COMPLEXITY ELEMENT	GUIDE TO NUMERIC RATING		
	1	3	5
Air Quality Values to be Protected	<ul style="list-style-type: none"> • Few smoke sensitive areas near fire • Smoke produced for less than 1 burning period • Air quality agencies generally require only initial notification and/or permitting • No potential for scheduling conflicts with cooperators 	<ul style="list-style-type: none"> • Multiple smoke sensitive areas, but smoke impact mitigated in plan • Smoke produced for 2-4 burning periods • Daily burning bans are sometimes enacted during the burn season • Infrequent consultation with air quality agencies is needed • Low potential for scheduling conflicts with cooperators 	<ul style="list-style-type: none"> • Multiple smoke sensitive areas with complex mitigation actions required • Health or visibility complaints likely • Smoke produced for greater than 4 burning periods • Multi-day burning bans are often enacted during the burn season • Smoke sensitive class 1 airsheds • Violation of state and federal health standards possible • Frequent consultation with air quality agencies is needed • High potential for scheduling conflicts with cooperators
Logistics	<ul style="list-style-type: none"> • Easy access • Duration of fire support is less than 4 days 	<ul style="list-style-type: none"> • Difficult access • Duration of fire support between 4 and 10 days • Logistical position assigned • Anticipated difficulty in obtaining resources 	<ul style="list-style-type: none"> • No vehicle access • Duration of support is greater than 10 days • Multiple logistical positions assigned • Remote camps and support necessary
Political Concerns	<ul style="list-style-type: none"> • No impact on neighbors or visitors • No controversy • No media interest 	<ul style="list-style-type: none"> • Some impact on neighbors or visitors • Some controversy, but mitigated • Press release issued, but no media activity during operations 	<ul style="list-style-type: none"> • High impact on neighbors or visitors • High internal or external interest and concern • Media present during operations

Wildland Fire Implementation Plan - Stage II

COMPLEXITY ELEMENT	GUIDE TO NUMERIC RATING		
	1	3	5
Tactical Operations	<ul style="list-style-type: none"> • No ignition or simple ignition patterns • Single ignition method used • Holding requirements minimal 	<ul style="list-style-type: none"> • Multiple firing methods and/or sequences • Use of specialized ignition methods (i.e. terra-torch, Premo Mark III) • Resources required for up to one week • Holding actions to check, direct, or delay fire spread 	<ul style="list-style-type: none"> • Complex firing patterns highly dependent upon local conditions • Simultaneous use of multiple firing methods and/or sequences • Simultaneous ground and aerial ignition • Use of heli-torch • Resources required for over 1 week • Multiple mitigation actions at variable temporal and spatial points identified. Success of actions critical to accomplishment of objectives • Aerial support for mitigation actions desirable/necessary
Interagency Coordination	<ul style="list-style-type: none"> • Cooperators not involved in operations • No concerns 	<ul style="list-style-type: none"> • Simple joint-jurisdiction fires • Some competition for resources • Some concerns 	<ul style="list-style-type: none"> • Complex multi-jurisdictional fires • High competition for resources • High concerns

Stage III Need Assessment Chart



To obtain the need indication, connect the top and bottom variables with a single line and then connect the left and right variables with a single line. Where the line crosses indicates the need for WFIP Stage III. The appropriate need is read directly off the chart.

Stage III: Long-Term Implementation Actions

Attach Stage I and Stage II information. Update and/or revise Stage I and II as necessary.

Objectives and Risk Assessment Considerations

Natural and Cultural
Resource Objectives and
Constraints/
Considerations

Maximum Manageable Area (MMA)

Acres in MMA:

Attach Map of MMA

Fire Projections, Weather, and Map

Projected Fire Area Under Expected Weather
Conditions

For date:

Area:

Projected Fire Area Under Experienced Severe
Weather Conditions

For date:

Area:

Wildland Fire Implementation Plan - Stage III

Weather Season/Drought:
Discussion and Prognosis

Long-Term Risk Assessment and Map (if applicable)

Risk Assessment
(Describe techniques
utilized and outputs,
include maps as
appropriate)

Probability of Success
Describe Probability of
Success

Threats

Threats to MMA

--

Threats to Public Use and
Firefighter Safety

--

Smoke Dispersion and
Effects

--

Other

--

Monitoring Actions

Wildland Fire Implementation Plan - Stage III

Describe Monitoring
Actions, Frequency,
Duration

Holding Actions

Describe Holding Actions,
Management Action
Points that initiate these
actions, and Key to Map if
necessary

Resources Needed to Manage the Fire

Wildland Fire Implementation Plan - Stage III

Describe resources necessary to accomplish ignition, holding, and monitoring actions

Estimated Costs of Managing the Fire

Describes costs in terms of resources needed, projected duration, etc.

Contingency

Actions Describe Contingency actions, management action points that initiate them, resources needed, etc.

Wildland Fire Implementation Plan - Stage III

Information Plan

Describe Information Plan,
Contacts,
Responsibilities, etc.

Post-burn Evaluation

Describe post-burn
evaluation procedures,
resource requirements,
costs, duration, etc.

Signatures

Include signatures/titles/
dates for preparing,
approving, and any
concurring individuals

PERIODIC FIRE ASSESSMENT, INSTRUCTIONS

The Periodic Fire Assessment is a process to prevent the unchecked escalation of an individual fire situation or the total fire management situation without evaluation and adequate planning.

Part 1 evaluates the capability to continue implementation of the appropriate management response to this fire for achieving resource benefits for a specified period following the assessment i.e., the next 24 hour period or longer, depending upon fire weather and fire behavior forecasts or other anticipated conditions. This assessment will be completed and periodically reviewed for validity. The "assessment frequency" box on page 1 specifies the frequency of assessing the particular fire. Assessment frequencies will be set by the local unit but are recommended to range from every day to every ten (10) days depending on the fuel type and geographic location of the fire. Recommendations for minimum assessment frequency include the following: Grass fuel types = daily; shrub and timber fuel types = every 1 – 5 days; Alaska = every 1 – 10 days.

The "valid date(s)" box is inclusive of those dates where the assessment remains valid, as indicated by the dated signature. When any decision elements change from "No" to "Yes", a new checklist must be completed for documentation purposes. A "Yes" response to any element on the Part 1 checklist indicates that the selected appropriate management response is not accomplishing or will not accomplish desired objectives and that a new strategic alternative should be developed immediately through the use of a Wildland Fire Situation Analysis (WFSA).

The Periodic Fire Assessment, Part 2 is a process that must be completed periodically for all wildland fires managed for resource benefits that do not have a completed WFIP Stage III. For isolated ignitions in fuel-limited situations, Part 2 does not have to be completed. When completing Part 2 of this checklist, if the chart indicates that WFIP Stage III is needed, it must be prepared within 24 hours.

When units establish monitoring and assessment frequency, it may be appropriate to develop a "step-up" system based on fire size or levels of fire activity. Then, as an individual fire gets larger or becomes more active, the monitoring and assessment frequency can correspondingly increase. Conversely, as fire activity lessens and fire size increases become less common, monitoring and assessment can "step-down" and become less frequent. **Units must identify standards and rationale for establishing assessment frequency, especially "step-up" and "step-down" actions.** If fire size is used as a determinant, then past burning rates should be used to formulate standards. If fire activity is used, then levels of burning (acres per day, etc.) must be definable and justifiable.

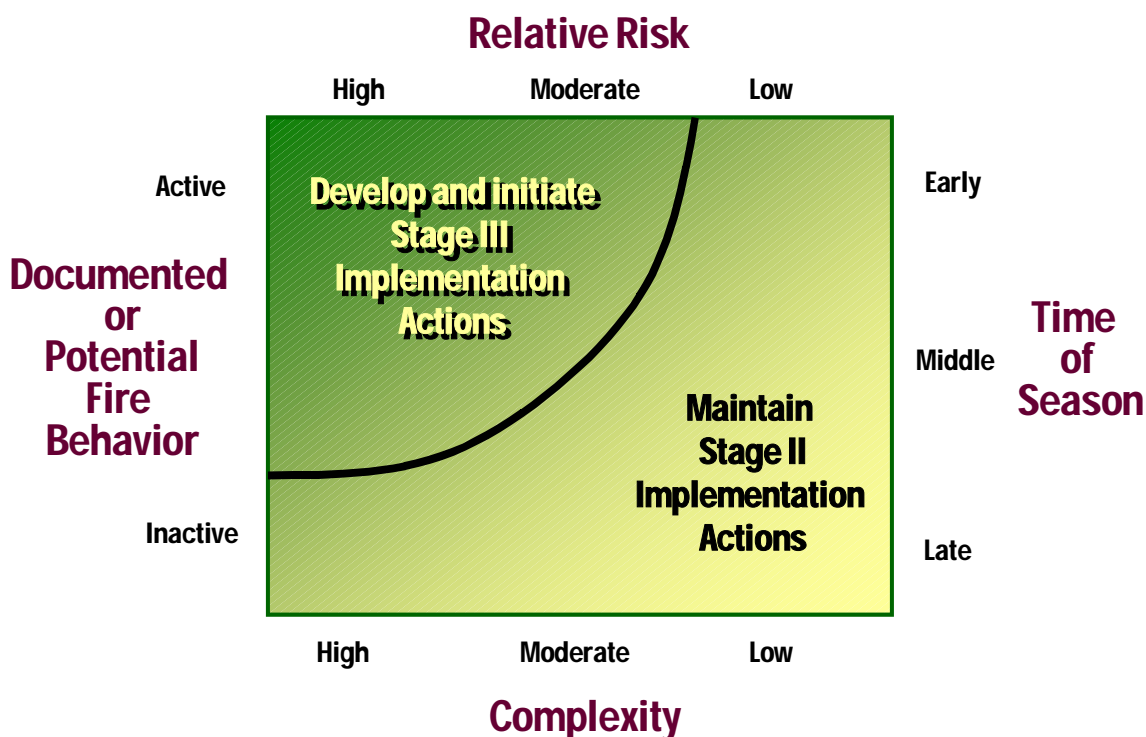
The Agency Administrator or delegated individual must sign the Signature Page on the specified assessment frequency.

PERIODIC FIRE ASSESSMENT
PART 1: RE-VALIDATION CHECKLIST

<i>Decision Element</i>	<i>Yes</i>	<i>No</i>
Is there a threat to life, property, or resources that cannot be mitigated?		
Are potential effects on cultural and natural resources outside the range of acceptable effects?		
Are relative risk indicators and/or risk assessment results unacceptable to the appropriate Agency Administrator?		
Is there other proximate fire activity that limits or precludes successful management of this fire?		
Are there other Agency Administrator issues that preclude wildland fire use?		
Do expected management needs for this fire exceed known capabilities?		

PERIODIC FIRE ASSESSMENT
PART 2: STAGE III NEED ASSESSMENT CHART

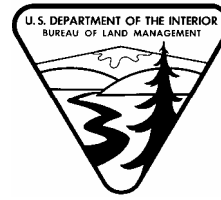
Stage III Need Assessment Chart



PERIODIC FIRE ASSESSMENT

SIGNATURE TABLE

[illegible]



WILDLAND FIRE SITUATION ANALYSIS

Wildland Fire Situation Analysis (WFSA) is a decision-making process in which the Agency Administrator or representative describes the situation, establishes objectives and constraints for the management of the fire, compares multiple strategic wildland fire management alternatives, evaluates the expected effects of the alternatives, selects the preferred alternative, and documents the decision. The format and level of detail required is dependent on the specific incident and it's complexity. The key is to document the decision.

WFSA INITIATION

FIRE NAME

JURISDICTION(S)

DATE AND TIME INITIATED

WFSA COMPLETION/FINAL REVIEW

THE SELECTED ALTERNATIVE ACHIEVED
DESIRED OBJECTIVES ON (DATE/TIME):

THE SELECTED ALTERNATIVE DID NOT
ACHIEVE THE DESIRED OBJECTIVES AND A
NEW WFSA WAS PREPARED ON (DATE/TIME):

AGENCY ADMINISTRATOR OR
REPRESENTATIVE SIGNATURE:

WFSA INSTRUCTIONS

Section I. WFSA Information Page

The Agency Administrator completes this page.

- I.A. Jurisdiction(s): Assign the agency that have or could have fire protection responsibility, e.g., USFWS, Forest Service, BLM, etc.
- I.B. Geographic Area: Assign the recognized "Geographic Coordination Area" in which the fire is located, e.g., Northwest, Northern Rockies, etc.
- I.C. Unit: Designate the local administrative unit, e.g., Hart Mountain Refuge Area, Flathead Indian Reservation, etc.
- I.D. WFSA #: Identify the number assigned to the most recent WFSA for this fire.
- I.E. Fire Name: Self-explanatory.
- I.F. Incident Number: Identify the agency number assigned to the fire, e.g., BOD 296, BNF 001.
- I.G. Accounting Code: Insert the local unit's accounting code.
- I.H. Date/Time Prepared: Self-explanatory.
- I.I. Attachments: Check here to designate attachments used in the completion of the WFSA. "Other" could include data or models used in the development of the WFSA. Briefly describe the "other" items used.

I. WILDLAND FIRE SITUATION ANALYSIS

A. JURISDICTION(S):

B. GEOGRAPHIC AREA:

C. UNIT(S):

D. WFSA #:

E. FIRE NAME:

F. INCIDENT #:

G. ACCOUNTING CODE:

H. DATE/TIME PREPARED:

I. ATTACHMENTS:

- ☐ COMPLEXITY MATRIX/ANALYSIS¹
- ☐ RISK ASSESSMENT¹
- ☐ PROBABILITY OF SUCCESS¹
- ☐ CONSEQUENCES OF FAILURE¹
- ☐ MAPS¹
- ☐ DECISION TREE²
- ☐ FIRE BEHAVIOR PROJECTIONS¹
- ☐ CALCULATIONS OF RESOURCE REQUIREMENTS¹
- ☐ OTHER (SPECIFY)

¹ Required

² Required by the USFS

Section II. Objectives and Constraints

The Agency Administrator completes this page.

- II.A. Objectives: Specify criteria that should be considered in the development of alternatives.

Safety objectives for firefighters, aviation, and public must receive the highest priority, Suppression objectives must relate to resource management objectives in the unit resource management plan.

Economic objectives could include closure of all portions of an area, thus impacting the public, or impacts to transportation, communication and resource values.

Environmental objectives could include management objectives for airshed, water quality, wildlife, etc.

Social objectives could include any local attitudes toward fire or smoke that might affect decisions on the fire, safety, etc.

Other objectives might include legal or administrative constraints which would have to be considered in the analysis of the fire situation, such as the need to keep the fire off other agency lands, etc.

- II.B. Constraints: List constraints on wildland fire action. These could include constraints to designated wilderness, wilderness study areas, environmentally or culturally sensitive areas, irreparable damage to resources or smoke management/air quality concerns. Economic constraints such as public and Agency cost could be considered here.

II. OBJECTIVES AND CONSTRAINTS

A. OBJECTIVES (must be specific and measurable):

1. *SAFETY:*
Public

Firefighter

2. *ECONOMIC:*

3. *ENVIRONMENTAL:*

4. *SOCIAL:*

5. *OTHER:*

B. CONSTRAINTS:

Section III. Alternatives

The FIRE MANAGER/and or INCIDENT COMMANDER complete(s) this page.

- III.A. Wildland Fire Management Strategy: Briefly describe the general wildland fire strategies for each alternative. Alternatives must meet resource management plan objectives.
- III.B. Narrative: Briefly describe each alternative with geographic names, locations, etc., that would be used when implementing a wildland fire strategy. For example, "Contain within the Starvation Meadows' watershed by the first burning period".
- III.C. Resources Needed: Resources listed must be reasonable to accomplish the tasks described in Section III.B. It is critical to also look at the reality of the availability of these needed resources.
- III.D. Estimated Final Fire Size: Estimated final size for each alternative at time of containment.
- III.E. Estimated Contain/Control Date: Estimates for each alternative shall be made based on predicted weather, fire behavior, resource availability and the effects of wildland fire management efforts.
- III.F. Cost: Estimate all fire costs for each alternative. Consider mopup, rehabilitation, and other costs as necessary.
- III.G. Risk Assessment: Probability of success/Consequences of failure: Describe probability as a % and associated consequences for success and failure. Develop this information from models, practical experience or other acceptable means. Consequences described will include fire size, days to contain, days to control, costs and other information such as park closures and effect on critical habitat. Include fire behavior and long-term fire weather forecasts to derive this information.
- III.H. Complexity: Assign the complexity rating calculated in the Guide for Assessing Fire Complexity.
- III.I. Maps: A map for each alternative must be prepared. The map shall be based on the "Probability of success/Consequences of Failure" and include other relative information.

III. ALTERNATIVES

	A	B	C
A. WILDLAND FIRE STRATEGY:			
B. NARRATIVE:			
C. RESOURCES NEEDED:			
HANDCREWS			
ENGINES			
DOZERS			
AIRTANKERS			
HELICOPTERS			
D. ESTIMATED FINAL FIRE SIZE:			
E. ESTIMATED CONTAIN/ CONTROL DATE			
F. COSTS:			
G. RISK ASSESSMENT: PROBABILITY OF SUCCESS/ CONSEQUENCES OF FAILURE			
H. COMPLEXITY:			
I. ATTACH MAPS FOR EACH ALTERNATIVE			

Section IV. Evaluation of Alternatives

The Agency Administrator(s), FMO and/or Incident Commander(s) completes this page.

IV.A. Evaluation Process: Conduct an analysis for each element of each objective and each alternative. Objective shall match those identified in section II.A. Use the best estimates available and quantify whenever possible. Provide ratings for each alternative and corresponding objective element. Fire effects may be negative, cause no change or may be positive. Examples are: 1) a system which employs a "-" for negative effect, a "0" for no change, and a "+" for positive effect; 2) a system which uses a numeric factor for importance of the consideration (soils, watershed, political, etc.) and assigns values (such as -1 to +1, -100 to +100, etc.) to each consideration, then arrives at a weighted average. If you have the ability to estimate dollar amounts for natural resource and cultural values this data is preferred. Use those methods which are most useful to managers and most appropriate for the situation and agency. To be able to evaluate positive fire effects, the area must be included in the resource management plan and be consistent with prescriptions and objectives of the Fire Management Plan.

Sum Of Economic Values: Calculate for each element the net effect of the rating system used for each alternative. This could include the balance of: pluses (+) and minuses (-), numerical rating (-3 and +3), or natural and cultural resource values in dollar amounts. (Again resource benefits may be used as part of the analysis process when the wildland fire is within a prescription consistent with approved Fire Management Plans and in support of the unit's Resource Management Plan.)

IV. EVALUATION OF ALTERNATIVES

A. EVALUATION PROCESS	A	B	C
<i>SAFETY</i>			
Firefighter			
Aviation			
Public			
Sum of Safety Values			
<i>ECONOMIC</i>			
Forage			
Improvements			
Recreation			
Timber			
Water			
Wilderness			
Wildlife			
Other (specify)			
Sum of Economic Values			
<i>ENVIRONMENTAL</i>			
Air			
Visual			
Fuels			
T & E Species			
Other (specify)			
Sum of Environmental Values			
<i>SOCIAL</i>			
Employment			
Public Concern			
Cultural			
Other (Specify)			
Sum of Social Values			
<i>OTHER</i>			

Section V. Analysis Summary

The Agency Administrator(s), FMO and/or Incident Commander(s) complete this page.

- V.A. Compliance with Objectives: Prepare narratives that summarize each alternative's effectiveness in meeting each objective. Alternatives that do not comply with objectives are not acceptable. Narratives could be based on effectiveness and efficiency. For example: "most effective and least efficient", "least effective and most efficient", "or "effective and efficient". Or answers could be based on a two-tiered rating system such as "complies with objective" and "fully complies with or exceeds objective". Use a system that best fits the manager's needs.
- V.B. Pertinent Data: Data for this section has already been presented and is duplicated here to help the Agency Administrator(s) confirm their selection of an alternative. Final Fire Size is displayed on page three, section III.D. Complexity is calculated in the attachments and displayed on page three, section III.H. Costs are displayed on page three, section III.F. Economic Values have been calculated and displayed on page four. Probability of Success/Consequences of Failure are calculated in the attachments and displayed on page three, section III.G.
- V.C. External and Internal Influences: Assign information and data occurring at the time the WFSA is signed. Identify the Preparedness Index (1 through 5) for the National and Geographic levels. If available, indicate the Incident Priority assigned by the MAC group. Designate the Resource Availability status. This information is available at the Geographic Coordination Center and needed to select a viable alternative. Designate "yes" indicating an up-to-date weather forecast has been provided to, and used by, the Agency Administrator(s) to evaluate each alternative. Assign information to the "other" category as needed by the Agency Administrator(s).

Section VI. Decision

Identify the alternative selected. Must have clear and concise rationale for the decision, and a signature with date and time. Agency Administrator(s) signature is mandatory.

V. ANALYSIS SUMMARY			
ALTERNATIVES	A	B	C
A. COMPLIANCE WITH OBJECTIVES: SAFETY ECONOMIC ENVIRONMENTAL SOCIAL OTHER			
B. PERTINENT DATA: FINAL FIRE SIZE COMPLEXITY COST RESOURCE VALUES PROBABILITY of SUCCESS CONSEQUENCES of FAILURE			
C. EXTERNAL/INTERNAL INFLUENCES: NATIONAL AND GEOGRAPHIC PREPAREDNESS LEVEL _____ INCIDENT PRIORITY _____ RESOURCE AVAILABILITY _____ WEATHER FORECAST (LONG-RANGE) _____ FIRE BEHAVIOR PROJECTIONS _____			

VI. DECISION	
The selected alternative is:	
RATIONALE:	

AGENCY ADMINISTRATOR SIGNATURE _____

DATE/TIME _____

Section VII. Daily Review

The Agency Administrator(s), or designate complete(s) this page.

The date, time and signature of reviewing officials are reported in each column for each day of the Incident. The status of Preparedness Level, Incident Priority, Resource Availability, Weather Forecast, and WFSA Validity is completed for each day reviewed. Ratings for the Preparedness Level, Incident Priority, Resource Availability, Fire Behavior, and Weather Forecast are addressed on page five, section V.C. Assign a "yes" under "WFSA Valid" to continue use of this WFSA. A "no" indicates this WFSA is no longer valid and another WFSA must be prepared or the original revised.

VII. DAILY REVIEW								
SELECTED ALTERNATIVE TO BE REVIEWED DAILY TO DETERMINE IF STILL VALID UNTIL CONTAINMENT OR CONTROL								
			WFSA VALID	FIRE BEHAVIOR PROJECTIONS	WEATHER FORECAST	RESOURCE AVAILABILITY	INCIDENT PRIORITY	PREPAREDNESS LEVEL
			DATE	TIME	BY			
IF WFSA IS NO LONGER VALID, A NEW WFSA WILL BE COMPLETED								

A GUIDE FOR ASSESSING FIRE COMPLEXITY

The following questions are presented as a guide to assist the Agency Administrator and staff in analyzing the complexity or predicted complexity of a fire situation. Because of the time required to assemble or move an Incident Management Team to a fire, this checklist should be completed when a fire escapes initial attack and be kept as part of the fire records. This document is prepared concurrently with the preparation of and attached to a new or revised Wildland Fire Situation Analysis. It must be emphasized that this analysis should, where possible, be based on predications to allow adequate time for assembling and transporting the ordered resources.

Use of the Guide:

1. Analyze each element and check the response yes or no.
2. If positive responses exceed, or are equal to, negative responses within any primary factor (A through G), the primary factor should be considered as a positive response.
3. If any three of the primary factors (A through G) are positive response, this indicates the fire situation is or is predicted to be Type I.
4. Factor H should be considered after all above steps. If more than two of these items are answered yes, and three or more of the other primary factors are positive responses, a Type I team should be considered. If the composites of H are negative, and there are fewer than three positive responses in the primary factors (A-G) a Type II team should be considered. If the answers to all questions in H are negative, it may be advisable to allow the existing overhead to continue action on the Fire.

GLOSSARY OF TERMS

Potential for blow-up conditions - **Any combination of fuels, weather and topography excessively endangering personnel.**

Threatened and endangered species - **Threat to habitat of such species, or in the case of flora, threat to the species itself.**

Smoke Management - **Any situation which creates a significant public response, such as smoke in a metropolitan area or visual pollution in high-use scenic areas.**

Extended exposure to unusually hazardous line conditions - **Extended burnout or backfire situations, rock slides, cliffs extremely steep terrain, abnormal fuel situations**

such as frost killed foliage, etc.

Disputed Fire Management responsibility - **Any wildland fire where responsibility for management if not agreed upon due to lack of agreements or different interpretations, etc.**

Disputed fire policy - **Differing fire policies between suppression agencies when the fire involves multiple ownership is an example.**

Pre-existing controversies - **These may or may not be fire management related. Any controversy drawing public attention to an area may present unusual problems to the fire overhead and local management.**

Have overhead overextended themselves mentally or physically - **This is a critical item that requires judgment by the responsible agency. It is difficult to write guidelines for this judgment because of the wide differences between individuals. If, however, the Agency Administrator feels the existing overhead cannot continue to function efficiently and take safe and aggressive action due to mental or physical reasons, assistance is mandatory.**

FIRE COMPLEXITY ANALYSIS

A. FIRE BEHAVIOR: Observed or Predicted		Yes/No
1. Burning Index (from on-site measurement of weather conditions). Predicted to be above the 90% level using the major fuel model in which the fire is burning.		___ ___
2. Potential exists for "blowup" conditions (fuel moisture, winds, etc).		___ ___
3. Crowning, profuse or long-range spotting.		___ ___
4. Weather forecast indicating no significant relief or worsening conditions.		___ ___
Total		___ ___
B. RESOURCES COMMITTED:		
1. 200 or more personnel assigned.		___ ___
2. Three or more divisions.		___ ___
3. Wide variety of special support personnel.		___ ___
4. Substantial air operation which is not properly staffed.		___ ___
5. Majority of initial attack resources committed.		___ ___
Total		___ ___
C. RESOURCES THREATENED:		
1. Urban interface.		___ ___
2. Developments and facilities.		___ ___
3. Restricted, threatened or endangered species habitat.		___ ___
4. Cultural sites.		___ ___
5. Unique natural resources, special designation zones or wilderness.		___ ___
6. Other special resources.		___ ___
Total		___ ___
D. SAFETY:		
1. Unusually hazardous fire line conditions.		___ ___
2. Serious accidents or fatalities.		___ ___
3. Threat to safety of visitors from fire and related operations.		___ ___
4. Restrictions and/or closures in effect or being considered.		___ ___
5. No night operations in place for safety reasons.		___ ___
Total		___ ___

E. OWNERSHIP:	Yes/No
1. Fire burning or threatening more than one jurisdiction.	___ ___
2. Potential for claims (damages).	___ ___
3. Different or conflicting management objectives.	___ ___
4. Dispute over fire management responsibility.	___ ___
5. Potential for unified command.	___ ___
Total	___ ___

F. EXTERNAL INFLUENCES:	
1. Controversial wildland fire management policy.	___ ___
2. Pre-existing controversies/relationships.	___ ___
3. Sensitive media relationships.	___ ___
4. Smoke management problems.	___ ___
5. Sensitive political interests.	___ ___
6. Other external influences.	___ ___
Total	___ ___

G. CHANGE IN STRATEGY	
1. Change in strategy (from lower to higher intensity management).	___ ___
2. Large amounts of unburned fuel within planned perimeter.	___ ___
3. WFSA invalid or requires updating.	___ ___
Total	___ ___

H. EXISTING OVERHEAD:	
1. Worked two operational periods without achieving initial objectives.	___ ___
2. Existing management organization ineffective.	___ ___
3. Overhead/IMT overextended mentally and/or physically.	___ ___
4. Incident actions plans, briefings, etc., missing or poorly prepared.	___ ___
Total	___ ___

Signature	
Date	Time

Appendix J

Minimum Impact Suppression Tactics Guidelines

General Discussion

Suppression tactics will have an impact on the landscape. Following the Minimum Impact Suppression Tactics (MIST) guidelines outlined below can reduce the degree of long-term impacts associated with wildland fire suppression tactics. It is important that decision makers are aware of the long-term impacts fire suppression tactics can have on the landscape, and very carefully weigh those long-term impacts to fire suppression safety issues related to wildland fire incidents. The following are MIST standards that will be used in CRMO.

Also refer to RM-18, Chapter 9, Exhibit 5

Tactical Standards

*Fireline construction will be minimized by taking advantage of natural barriers, rock outcrops, trails, roads, streams, and other existing fuel breaks.

*Firelines will be the minimum width necessary to halt the spread of the fire and will be placed to avoid impacts to natural and cultural resources vulnerable to the effects of fire and fire suppression activities.

*Limbing along the fireline will be done only as essential for the suppression effort and for safety.

*Unburned material may be left within the final line.

*Clearing and scraping will be minimized.

*Snags or trees will be felled only when essential for control of the fire or for safety of personnel.

*Where possible, on site archeological clearance will be obtained prior to line construction.

Terminating the Fire

*The route to the fire from the nearest trail or road will be flagged. Flagging will be removed by the last person to leave the area.

*All equipment and debris will be removed from the area for proper disposal.

*Before leaving the fire, rehabilitation will be completed to eliminate impacts from the suppression effort.

Restoration of Fire Area

- *Backfill cup trenches and scarify wide firelines.
- *Construct waterbars to prevent erosion.
- *Place “boneyards” in a natural or random arrangement.
- *Position cut ends of logs so as to be inconspicuous to visitors and camouflage where possible.
- *Flush cut stumps, camouflage with soil and moss.

Wilderness Fire Campsites

- *Use existing campsites if available.
- *If existing sites are not available, select impact resistant sites a minimum of 200 ‘ from water resources.
- *Site selection will be based on the advice of a resource/wilderness advisor.
- *Establish several small camps rather than one large one.
- *Use stoves and minimize camp improvements.
- *Vary travel routes to the greatest extent possible to reduce impact.

Aircraft

Helicopters

- *Minimize use.
- *Use natural openings for helicopter landings.
- *Restore helispots.

Retardant Aircraft

- Retardant drops require Superintendent’s approval.
- Use water drops where practical.
- Minimize number of drops to what is essential for control of the fire.

Appendix K (Cooperative Agreements)

Southern Idaho Interagency Dispatch Center

BLM/NPS Annual operating Plan

SOUTHERN IDAHO INTERAGENCY DISPATCH CENTER 1999 OPERATING PLAN

between

STATE OF IDAHO

IDAHO DEPARTMENT OF LANDS

**IDAHO DEPARTMENT OF PARKS & RECREATION
MALAD GORGE STATE PARK
CITY OF ROCKS NATIONAL RESERVE**

U S DEPARTMENT OF THE INTERIOR

**NATIONAL PARK SERVICE
CRATERS OF THE MOON NATIONAL MONUMENT
HAGERMAN FOSSIL BEDS NATIONAL MONUMENT**

**BUREAU OF LAND MANAGEMENT
UPPER SNAKE RIVER DISTRICT-SOUTH CENTRAL
IDAHO FIRE OPERATIONS**

**U S FISH & WILDLIFE SERVICE
HAGERMAN NATIONAL FISH HATCHERY**

TABLE OF CONTENTS

I.	Introduction	1
2.	Areas of Responsibility	2
	2.1 Aviation	2
	2.2 Resource Ordering and Status	3
	2.2.1 Resource Ordering	3
	2.2.2 Resource Orders Received	3
	2.2.3 Resource Supply Orders	3
3.	Communications	3
	Radio	3
	Data, Phone, E-Mail	4
4.	Procedures	5
	4.1 Daily and Normal Situation Reporting	5
	4.2 Hours of Operation	5

1. INTRODUCTION

This Annual Operating Plan is authorized by the Reciprocal Fire Protection Act of May 27, 1955 (42 U.S.C. 1856a), the Cooperative Fire Agreement between the United States Department of the Interior (USDI), Bureau of Land Management (BLM) and the United States Department of Agriculture (USDA), Forest Service (BLM reference number Idaho-174, November 23, 1979); the Cooperative Fire Agreement between the State of Idaho, Department of Lands and the USDA Forest Service, Northern and Intermountain Regions (Agreement number RO-85-COOP Fire-001, March 27, 1984); the Cooperative Fire Agreement between the USDI Fish and Wildlife Service (FWS) and the Regional Forester, USDA Forest Service of Ogden, Utah (Agreement number 22-23, May 18, 1971); and the Cooperative Fire Agreement between the USDI BLM and the State of Idaho (Agreement No. 11-910-CT4-1, August 9, 1973). This Operating Plan will become effective when signed in 1999.

The purpose of this plan is to coordinate the wildland fire, aviation and logistical functions of the State of Idaho, Department of Lands and Department of Parks & Recreation {Malad Gorge State Park and City of Rocks National Reserve}; U. S. Department of the Interior, National Park Service {Craters of the Moon National Monument and Hagerman Fossil Beds National Monument} and the Bureau of Land Management {South Central Idaho Fire Operations} ; U. S. Fish & Wildlife Service, Hagerman National Fish Hatchery (hereafter called Units). The Southern Idaho Interagency Dispatch Center (SIIDC) is designed to dispatch fire resources and coordinate logistical activities among the units to better utilize all resources and implement the closest forces concept.

Fire management program activities (i.e. fire reports, notification to entities, prescribed fires, etc.) will remain in the purview of each respective Unit, as well as all functions of initial attack dispatch planning. This plan in no way curtails, supersedes, or diminishes any unit's responsibility or authority in operating their individual organization.

It is understood that this plan addresses only the administration and logistical support functions for the participating units and that no exchange of funds, goods, or services will be authorized within the scope of this plan, with the exception of Idaho Department of Lands who lease the SIIDC Dispatch Center for the other agencies.

This plan must be amended or modified as mutually agreed upon by all parties through correspondence, (i.e., FAX or MAIL).

Each agency should retain a copy of this plan for subsequent amendments and possible clarification.

All signing entities will have their respective fire staffs review the SIIDC Operating Plan on an annual basis to assure that all portions of the plan are current and operating as prescribed. Authority for updating and/or making minor changes is delegated to, and the responsibility of, individual agency fire staff directors. In the event a significant change is necessary, the plan will be distributed to each Unit's Agency Administrator for approval and signature.

2. AREAS OF RESPONSIBILITY

SIIDC will serve as a coordination center for the previously stated units and will have responsibility for the following areas:

1. Aviation (Fire and as requested, non-fire)
2. Resource and Fire Supply Ordering (non-fire as requested)
3. Resource Status
4. EGBCC Situation Reporting
5. EGBCC Receiving and Distributing Reports
6. Receiving and Relaying Resource and Overhead Orders

2.1 AVIATION

All Aviation Management functions remain with the individual units. SIIDC will be responsible for flight following all aircraft in-flight to and from incidents or bases. When an aircraft arrives at the incident, flight following will become the responsibility of the incident until it leaves the incident, whereby SIIDC will again resume flight following (positive hand-off will be documented by SIIDC).

All Point-to-Point flights should be tracked through FAA with a standard flight plan (See Great Basin Mob Guide - Section 24.1.2.C) unless the unit requests SIIDC to flight follow the aircraft.

All aircraft needs beyond those of the individual agencies for initial attack should be ordered through SIIDC.

A Resource Order will be completed for any initial attack aircraft on an incident that goes beyond initial attack or that will be used into the next burning period. All ordering of initial attack aircraft will be according to the Great Basin Mob Guide standards.

When flight following aircraft, SIIDC will initiate the procedure for a down or missing aircraft by notifying the appropriate Unit. The notified unit will then activate their Search and Rescue Plan following their agency guidelines. SIIDC will assist the unit when requested.

Reconnaissance flights of all types (other than those attached to an incident), will flight follow with SIIDC.

Upon request SIIDC will assist in arranging for aircraft for non-fire missions. The requesting unit will be responsible for filling out a flight request/schedule form and SIIDC will arrange for the appropriate aircraft. All payment for non-fire flights will be through the ordering agency unless approved by the SIIDC manager.

Twin Falls Retardant Base - The Twin Falls Retardant Base is staffed seven days a week during the fire season. The hours of operation are 0930-1800 and are extended when there is fire activity. During the early and late season the base is staffed on an as needed basis and there may be minor delays in activating the base.

2.2 RESOURCE ORDERING AND STATUS

Daily Resource Availability Reports will be transmitted to SIIDC by 1000. When a status change occurs with a unit's fire resources that may impact other units, SIIDC should be notified as soon as possible. If a unit is responding to a fire on their unit, the center should be notified immediately.

SIIDC will send a location summary of all units in the area to all units by 1100 each day. If significant changes occur the summary will be updated.

2.2.1. RESOURCE ORDERING

All entities will order initial attack forces via guidelines specified within the Great Basin Mob Guide section 21. Usually, the units will only need to call SIIDC and the order will be placed by the center.

2.2.2. RESOURCE ORDERS RECEIVED

All resource orders from EGBCC or other centers outside of local agreements will be processed through SIIDC. SIIDC will notify the affected units of the incoming resource orders to facilitate filling the orders in a timely manner. All resource orders from EGBCC will be distributed as equally as possible. Consultation with each affected unit's Fire Management Staff will determine what a particular unit can/will contribute to filling a resource order.

Overhead resource orders will be filled based upon the individual unit's ability to fill the order. Overhead resource orders will be filled and processed in the same manner as standard resource orders.

2.2.3. RESOURCE SUPPLY ORDERS

Emergency resource or supply orders being used for an ongoing fire, and those going directly to a fire, will normally be ordered through SIIDC and be filled by the nearest source of supply. SIIDC will attempt to fill orders through the local caches first.

All non-fire orders and restocking orders will be processed by the separate units according to their individual policies and the Great Basin Mob Guide. SIIDC will give assistance with the orders when requested. SIIDC will facilitate orders placed to the Great Basin Cache in Boise when requested.

3. COMMUNICATIONS

3.1. RADIO

SIIDC and the South-Central Idaho Fire Operations will follow the State BLM Radio channeling plan. All unit's radio frequencies are displayed in Appendix 1.

3.2. DATA, PHONE, E-MAIL

ORGANIZATION	CONTACT PERSON	ADDRESS	PHONE NUMBERS	EMAIL ADDRESS
SIIDC	Dispatcher on Duty or Frank Miller	P. O. Box 2B 213 West F Street Shoshone, ID 83352	886-2373 or 886-7633 Fire: 800-974-2373 Fax: 886-7316 Frank Cell: 731-0753	ID_SID_Dispatch@blm.gov or Frank_Miller@blm.gov
South-Central Idaho Fire Operations - Burley	Mark Wiseman	200 S. Oakley Highway Burley, ID 83318	677-6649 or 677-6645 Fax: 677-6655	Mark_Wiseman@blm.gov
South-Central Fire Operations - Shoshone	Mike Aoi	400 West F Street Shoshone, ID 83352	886-7228 Fax: 886-7327	Michael_Aoi@blm.gov
City of Rocks National Monument	Randy Farley	P. O. Box 169 Almo, ID 83312	824-5519 or 824-5535 Fax: 824-5563	Randy Farley@nps.gov
Craters of the Moon National Monument	George Rummele Tammy Henderson	P. O. Box 29 Arco, ID 83213	527-3257 Fax: 527-3073	George Rummele@nps.gov
Hagerman National Fish Hatchery	Bryan Kenworthy	3059 D Nat'l Fish Hatchery Road Hagerman, ID 83332	837-4896 Fax: 837-6225	bryan_kenworthy@fws.gov
Hagerman Fossil Beds National Monument	James Ward	P. O. Box 570 Hagerman, ID 83332	837-4793 Fax: 837-4857	James_Ward@nps.gov
Idaho Department of Lands	Howard Kestie Max Hall	329 Washington P. O. Box 149 Gooding, ID 83330	934-5606 Fax: 934-5362	
Malad Gorge State Park	Kevin Lynott	1074 East 2350 South Hagerman, ID 83332	837-4505	mao@idpr.state.id.us

4. PROCEDURES

4.1 DAILY AND NORMAL SITUATION REPORTING

SIIDC will transmit a daily cumulative list of available resources from all units to the Eastern Great Basin Coordination Center (EGBCC). Units will send the Daily Situation Report to SIIDC one-half hour before the report is due into EGBCC. (This will be established on a yearly basis.) If no report is received by SIIDC by the prescribed time, SIIDC will report the unit's previous day's resource status.

All Situation Reports will be processed through SIIDC unless otherwise directed or negotiated.

4.2 HOURS OF OPERATION

Summer hours typically run from June through September, with the exception of Hagerman Fossil Beds whose summer hours are from Memorial Day through Labor Day. Hours are subject to change due to weather, fire conditions, etc. All Dispatch Centers and/or offices should keep SIIDC informed of any change in operational hours or of special needs. SIIDC will extend the hours upon request.

SIIDC will publish a list for all units of on-call personnel for after hours calls by 1800 on the **Friday** preceding the coming week.

	SUMMER HOURS	SPRING/FALL HOURS	WINTER HOURS
SIIDC	0700-2200 - 7 days/wk	0700-1800 - 5 days/wk	0745-1630 - 5 days/wk
CITY OF ROCKS	0800-1700 - 7 days/wk	0800-1700 - 7 days/wk	0800-1700 - 5 days/wk
CRATERS OF THE MOON	0800-1800 - Daily	0800-1630 - Daily	0800-1630 - Daily
HAGERMAN FOSSIL BEDS	Office: 0800-1700 M-F Public: 0900-1700 7 days/wk	Office: 0800-1700 M-F Public: 1000-1600 Thurs thru Sun	Same as Spring/Fall Hours
HAGERMAN HATCHERY	0700-1530 - 5 days/wk	0730-1600 - 5 days/wk	0730-1600 - 5 days/wk
IDAHO DEPT OF LANDS	0730-1700 - 5 days/wk	0730-1700 - 5 days/wk	0730-1700 - 5 days/wk
MALAD GORGE	0800-1700 - 7 days/wk	0800-1700 - 5 days/wk	0800-1700 - 5 days/wk
SOUTH-CENTRAL IDAHO AREA FIRE OFFICE	0800-1800 - 7 days/wk	0745-1700 - 5 days/wk	0745-1630 - 5 days/wk

CRMO Fire Management Plan
Appendix K
Appendix 1 - RADIO FREQUENCIES

ORGANIZATION	TRANSMIT	RECEIVE	TX CODE GUARD
SIIDC - SHOSHONE Direct Bald Mountain - Ketchum/Sun Valley Davis Mountain - Bliss/King Hill Bell Mountain - Carey/Craters TAC - 3 - Scene of Action	163.9125 163.0250 163.0250 163.0250 164.5500	163.9125 163.9125 163.9125 163.9125 164.5500	none 107.2 114.3 131.8
SIIDC - BURLEY Direct Magic Mountain - Rogerson/Jarbridge Mt. Harrison - Burley/Twin Falls Malad Peak - Eastern side of dist Twin Peaks - Park Valley, UT TAC - 2 - Scene of Action	163.8625 163.0750 163.0750 163.0750 163.0750 163.1750	163.8625 163.8625 163.8625 163.8625 163.8625 163.1750	none 100.0 107.2 114.3 123.0
City of Rocks They monitor our frequencies and will coordinate with us in case of emergency.			
Craters of the Moon Repeater Channel-1 Direct Channel-1	172.675 171.675	171.675 171.675	123.0
Hagerman National Fish Hatchery They monitor our frequencies and will coordinate with us in case of emergency.			
Hagerman Fossil Beds Direct	172.650	172.650	
Idaho Department of Lands They monitor our frequencies and will coordinate with us in case of emergency.			
Malad Gorge	TX 151.35500	RX 151.35500	none

CRMO Fire Management Plan
Appendix K

--	--	--	--

APPROVED BY (Unit Administrators)

<p>_____ Jim Morrison, Superintendent Date Craters of the Moon National Monument P. O. Box 239 Arco, ID 83213 Telephone: (208) 527-3257</p>	<p>_____ Jim May, Acting District Manager Date Upper Snake River District BLM 1405 Hollipark Drive Idaho Falls, ID 83401 Telephone: (208) 524-7501</p>
<p>_____ Neil King, Park Superintendent Date Hagerman Fossil Beds National Monument National Park Service P. O. Box 570 Hagerman, ID 83332-0570 Telephone: (208) 837-4793</p>	<p>_____ Ned Jackson, Park Superintendent Date City of Rocks National Reserve Idaho Dept. of Parks & Recreation P. O. Box 169 Almo, ID 83312 Telephone: (208) 824-5519</p>
<p>_____ Bryan Kenworthy, Station Manager Date Hagerman National Fish Hatchery U. S. Fish & Wildlife Service 3059 D, National Fish Hatchery Road Hagerman, ID 83332 Telephone: (208) 837-4896</p>	<p>_____ Kevin M. Lynott, Park Manager Date Malad Gorge State Park Idaho Department of Parks & Recreation Rt. 1, P. O. Box 358 Hagerman, ID 83332 Telephone: (208) 837-4505</p>
<p>_____ Howard Kestie , District Manager Date Idaho Department of Lands 329 Washington Gooding, ID 83330 Telephone: (208) 934-5606</p>	

BLM/NPS Annual operating Plan

**ANNUAL OPERATING PLAN
1999**

**BETWEEN
DEPARTMENT OF INTERIOR,**

BUREAU OF LAND MANAGEMENT
Upper Snake River District,
South Central Idaho Area

NATIONAL PARK SERVICE
Craters of the Moon National Monument
Hagerman Fossil Beds National Monument

FISH AND WILDLIFE SERVICE
Hagerman National Fish Hatchery

**and
THE STATE OF IDAHO,**

IDAHO DEPARTMENT OF LANDS
Gooding Area Office

IDAHO DEPARTMENT OF PARKS AND RECREATION
Malad Gorge State Park
City of Rocks National Reserve

INTRODUCTION

This operating plan involves the lands located in Idaho under the jurisdiction of the Bureau of Land Management (BLM) Upper Snake River District, The Idaho Department of Lands, Idaho Department of Parks and Recreation (Malad Gorge State Park, City Of Rocks Reserve), the U.S. National Park Service (Craters of the Moon National Monument, Hagerman Fossil Beds National Monument), and the U.S. Fish and Wildlife Service (Hagerman National Fish Hatchery and their cooperators).

The purpose of this plan is to coordinate the fire management activities of the State of Idaho, (Idaho Department of Lands, Malad Gorge State Park, and City of Rocks National Reserve), National Park Service (Craters of the Moon National Monument and Hagerman Fossil Beds National Monument), Fish and Wildlife Service, Hagerman National Fish Hatchery, and the Bureau of Land Management, South Central Idaho Area. Hereafter called Units.

The participating Units will establish a mutual response area between the parties to this plan using the closest forces concept.

This Annual Operating Plan is authorized by the Reciprocal Fire Protection Act of May 27, 1955 (42 USC - 1856a); Department of Interior and Related Agencies Appropriations Act, 1999, as included in Public Law 105-277, section 101(e); the Federal Land Policy and Management Act of 1976 (43 U.S.C. 1748 et seq.); and the Cooperative Fire Protection Agreement between USDI BLM Idaho, NPS Pacific West Field Area, BIA Portland Area, FWS Pacific Region, USDA Forest Service Pacific Northwest, Intermountain, and Northern Regions, and the State of Idaho Department of Lands, (BLM Reference Number 1422D910A60203), dated 3/29/96, the Mutual Aid Agreement between the Bureau of Land Management, Upper Snake River District and the City of Rocks National Reserve, and the Mutual Aid Agreement between the Bureau of Land Management, Upper Snake River District and the Malad Gorge State Park.

1. PROTECTION RESPONSIBILITIES

A. MUTUAL RESPONSE AREA

All the participating Units agree to provide suppression response on a closest forces concept which does not diminish their ability to meet their own jurisdictional responsibilities. To be more specific the Craters of the Moon agrees to respond to fires within at least one mile of their protection boundary while the BLM agrees to send an engine to cover the Monument's responsibilities. The City of Rocks National Reserve agrees to respond to fires as indicated in Appendix 1, Maps and the mutual aid agreement between the City of Rocks and the BLM. The BLM agrees to provide supporting suppression resources to any of the participating entities.

II. OPERATIONAL PROCEDURES

A. SUPPRESSION ACTION

Prompt and efficient initial attack shall be made on all fires in accordance with this operating plan and the Southern Idaho Interagency Dispatch Center (SIIDC). The closest available initial attack forces will be dispatched to the incident regardless of jurisdiction. Each Unit will provide an Incident Commander for any fire that occurs within their jurisdiction except for the Hagerman National Fish Hatchery where the responding Unit will provide a qualified Incident Commander for all fires. The standards for fire suppression on the Hagerman National Fish Hatchery are attached in Appendix 2.

The BLM agrees to; when responding to a fire of another Unit by helicopter, meet their Incident Commander or representative at any requested location.

The first forces to reach an incident will initiate fire suppression operations and management until the qualified personnel of the jurisdictional Unit arrive to assume control except for aforementioned case of the Hagerman National Fish Hatchery. All fires will be managed under the Incident Command System. Any shift in command during or after initial attack will be documented in writing and logged by Southern Idaho Interagency Dispatch Center.

Any Unit which responds to a fire outside their jurisdiction agrees to notify the jurisdictional agency. The BLM agrees to notify the Idaho Department of Lands Office in Gooding for approval to take suppression action on State lands which are in geographic blocks of 2,500 acres or larger.

All personnel involved in fire suppression activities will adhere to National Wildfire Coordinating Group (NWCG) requirements for Personnel Protective Equipment, training, and safety.

The BLM agrees to provide any reasonable presuppression assistance for other entity's engines and equipment. This may include inspection of engines and equipment, assistance with maintenance, or use of BLM facilities to effect minor repairs.

The BLM agrees to assist in procuring suppression supplies and provide supplies through their warehouse during fire emergencies.

The Craters of the Moon agrees to store BLM supplies within their own cache for use by both entities and allow the use of their supplies.

B. Air Operations

Air tankers, fixed wing, helicopters and other aviation resources will be used in accordance with the jurisdictional Unit's policy.

If any aerial reconnaissance flights are planned by any Units in the mutual response area, the Unit will coordinate the activities through SIIDC

C. Communications

1. The IRAC/FCC regulations and specific agency guidelines dictate a prescribed format be followed to acquire approval for interagency use of allocated radio frequencies. The following radio frequencies are included in this operating plan to facilitate this approval. Unit administrator signature is required in this process. Signature to this annual operating plan is authorizing use of the frequencies on initial attack and sustained attack responses on a per incident basis.

2. Frequencies that may be utilized by Units party to this annual operating plan while managing incidents for the benefit of one or more jurisdictions are listed in Appendix 3.

III. FIRE PREVENTION

A. Information and Education

Prevention activities for local, civic, and educational groups will be coordinated among the participating entities. The contact for assistance from the BLM will be Curtis Jensen at the Shoshone Office at 886-7311.

B. Restrictions and Closures

Fire restrictions and closures procedures for State and Federal entities are outlined in the "Operating Plan for the Implementation of Fire Restrictions/Closures in Idaho". All Units are represented by the plan and adhere to the requirements.

IV. Training

All training activities will be coordinated among the participating Units to avoid duplication and to provide for efficient use of time, personnel, and expenditures.

All personnel involved in suppression activities will meet NWCG requirements for training and qualifications. Each Unit will be responsible for the certification of their own employees.

The BLM agrees to maintain a yearly fire school by providing S-130 and S-190 and to provide refresher training for "10 and 18", "fire shelter", and "LCES". The BLM contact for training will be Dennis Smith at the Burley Field Office at 677-6644.

V. FUELS MANAGEMENT

Fuels management activities will be coordinated with the participating Units to maximize training opportunities, facilitate the completion of management ignitions, and to minimize the impacts to neighboring Units.

Cooperating Units to this plan agree to notify other participating Units of prescribed burns, limited suppression areas, etc. which are being formulated so that all concerned agencies may be involved in the planning process.

The BLM agrees to notify the Craters of the Moon of any management ignitions which may impact the Class I Airshed.

The BLM contact for fuels management will be Ray Mitchell at the Shoshone Field Office at 886-7245.

VI. SMOKE MANAGEMENT

The requirements and procedures of State and Federal entities for Smoke Management within Idaho are outlined in the *Montana/Idaho Airshed Group Plan* (Implementation Date Fall 1999).

VII. BILLING PROCEDURES

By virtue of the authorizing agreements which are identified in the preamble there will be no billing for services or expenditures between the Units except as outlined in the Cooperative Fire Protection Agreement of 3/29/96.

VIII. CLAIMS AND CONFLICTS

All claims have been addressed in the original agreements, which are identified in the preamble.

In the event of any conflict between the provisions of this operating plan and the provisions of the agreements, the provisions of the agreements will govern.

IX. LOGISTICAL SUPPORT

The BLM agrees to provide logistical support to all the operating entities as identified in the Memorandum of Understanding and the Annual Operating Plan for the Southern Idaho Interagency Dispatch Center (SIIDC). The items addressed within the SIIDC plan include the following: Aviation, Resource Ordering, Communications, and Situations Reporting.

X. EFFECTIVE DATE

The terms of this operating plan shall become effective for each signer on the date of signing. The operating plan will remain in effect until ratification of a new plan or; when major changes or revisions necessitate the signing by agency administrators.

XI. ANNUAL MEETING

This Annual Operation Plan will be reviewed in April of each year and will be hosted by the Bureau of Land Management. The host will arrange meeting date, time, and location.

All signing entities will have their respective fire staffs review the Operating Plan on an annual basis to assure that all portions of the plan are current and operating as prescribed. Authority for updating and/or making minor changes is delegated to, and the responsibility of, individual agency fire staff directors. In the event a significant change is necessary, the plan will be distributed to each Unit's Agency Administrator for approval and signature.

APPENDIX 3 UNIT RADIO FREQUENCIES

ORGANIZATION	TRANSMIT FREQUENCY	RECEIVE FREQUENCY	STONE GUARD
SIIDC - SHOSHONE			
Direct	163.9125	163.9125	none
Bald Mountain - Ketchum/Sun Valley	163.0250	163.9125	107.2
Davis Mountain - Bliss/King Hill	163.0250	163.9125	114.3
Bell Mountain - Carey/Craters	163.0250	163.9125	131.8
TAC - 3 - Scene of Action	164.5500	164.5500	
SIIDC - BURLEY			
Direct	163.8625	163.8625	none
Magic Mountain - Rogerson/Jarbridge	163.0750	163.8625	100.0
Mt. Harrison - Burley/Twin Falls	163.0750	163.8625	107.2
Malad Peak - Eastern side of dist	163.0750	163.8625	114.3
Twin Peaks - Park Valley, UT	163.0750	163.8625	123.0
TAC - 2 - Scene of Action	163.1750	163.1750	
City of Rocks They monitor our frequencies and will coordinate with us in case of emergency.			
Craters of the Moon			
Repeater Channel-1	172.675	171.675	123.0
Direct Channel-1	171.675	171.675	
Hagerman Fossil Beds			
Direct	172.650	172.650	
Idaho Department of Lands They monitor our frequencies and will coordinate with us in case of emergency.			
Malad Gorge	151.35500	151.35500	none

APPROVED BY (Unit Administrators):

<p>_____ Jim Morris Superintendent Craters of the Moon National Monument P. O. Box 239 Arco, ID 83213 Telephone: (208) 527-3257</p> <p>Date</p>	<p>_____ Ned Jackson Park Superintendent City of Rocks Preserve Dept. of Parks & Recreation P. O. Box 169 Almo, ID 83312 Telephone: (208) 824-5519</p> <p>Date</p>
<p>_____ Jim May District Manager Upper Snake River District South Central Idaho Area 1405 Hollipark Drive Idaho Falls, ID 83401 Telephone: (208) 524-7501</p> <p>Date</p>	<p>_____ Bryan Kenworthy Station Manager U. S. Fish & Wildlife Service Hagerman National Fish Hatchery 3059 D, National Fish Hatchery Road Hagerman, ID 83332 Telephone: (208) 837-4896</p> <p>Date</p>
<p>_____ Neil King Superintendent Hagerman Fossil Beds National Monument National Park Service P. O. Box 570 Hagerman, ID 83332-0570 Telephone: (208) 837-4793</p> <p>Date</p>	<p>_____ Kevin M. Lynott Park Manager Malad Gorge State Park Idaho Department of Parks & Recreation Rt. 1, P. O. Box 358 Hagerman, ID 83332 Telephone: (208) 837-4505</p> <p>Date</p>
<p>_____ Howard Kestie Superintendent Idaho Department of Lands 329 Washington Gooding, ID 83330 Telephone: (208) 934-5606</p> <p>Date</p>	

ANNUAL UPDATE

UNIT	2000	2001	2002	2003	2004
Idaho Department of Lands					
Malad Gorge State Park					
City of Rocks National Reserve					
Hagerman Fossil Beds National Monument					
Craters of the Moon National Monument					
Hagerman National Fish Hatchery					
BLM, Upper Snake River District					

Appendix I (Wildland Fire Prevention Plan)

Wildland Fire Prevention Plan

I. Introduction

Wildland fire prevention efforts in Hagerman Fossil Beds National Monument (HAFO) will be directed toward human-caused ignitions that pose a threat to visitors, employees, neighbors, facilities, cultural/paleontological resources and natural resources of HAFO. The HAFO prevention program is based on the relative risk of ignitions in the Monument, the hazards associated with the risks and finally the values at risk of being burned.

A. Objectives

- Prevention of wildland fires in the Monument and the spread of fire onto adjacent lands.
- Reduce the threat of human-caused fires through visitor, employee and regional education programs.
- Reduce the threat of human-caused fires through patrol techniques based upon the HAFO step-up plan.
- Reduce the spread of wildland fires through aggressive suppression strategies.
- Integrate wildland fire prevention messages into interpretive programs.

B. General Actions

General prevention actions are designed to reduce the number of human-caused fires on the Monument. Cooperative efforts with other fire fighting organizations will also lead to a reduction of wildland fires outside of Monument boundaries which may have potential to impact the Monument.

- Prevention actions will be based upon the HAFO Step-up Plan for wildland fire preparedness.
Responsibility: Collateral Duty FMO Completed by: On-going
- Fire preparedness equipment will be maintained in a ready state during periods of wildland fire danger.
Responsibility: Collateral Duty FMO Completed by: Initial – May 1st, then ongoing
- Fire prevention will be a daily employee-briefing topic during periods of high fire danger. Topics will include prevention messages and the objectives of the fire management program.
Responsibility: Staff/Supervisors Completed by: On-going
- HAFO will cooperate with the Southern Idaho Interagency Dispatch Center in promoting prevention messages for the region.
Responsibility: Collateral Duty FMO Completed by: On-going
- Prevention messages given to the public will include the positive effects of prescribed fire as well as standard fire prevention messages.

Responsibility: Collateral Duty FMO will provide general and specific messages to staff Completed by: General messages – June 1 Specific Messages – on-going

- During periods of extreme or prolonged fire danger fire prevention messages will be incorporated into all interpretive programs.
Responsibility: message: Collateral Duty FMO, presentation: Staff Completed by: On-going
- Any emergency closures based on fire danger will include a fire prevention message.
Responsibility: Superintendent Completed by: On-going
- Fire prevention and fire effects information will be made available to the public during any prescribed fire operations in HAFO.
Responsibility: Collateral Duty FMO Completed by: On-going
- HAFO will work on reestablishing green belts along county roads accessing the Monument.
Responsibility: Collateral Duty FMO Completed by: On-going

II. HAFO Wildland Fire Risks

HAFO historically has had a low number of annual wildland fire occurrences. In the last ten years there have been five fires averaging sixty-seven acres in size.

Visitor usage in HAFO is centered on hiking, motoring, horseback riding and some hunting in the zone adjacent to the reservoir. Visitor use can be a source of ignitions in the Monument.

Agricultural burning, off-road vehicle use and other uses of land outside of HAFO's boundaries do occur on a regular basis. Off-road vehicle use is not permitted in HAFO except for maintenance activities.

III. HAFO Hazards

HAFO contains fuel types that are very susceptible to ignition. Wyoming big sage with associated grasses and forbs comprise a fuel bed that will burn with high spread rates, especially under wind and slope effects. Areas with cheat grass also exhibit high flammability and associated fire spread rates.

IV. HAFO Values At Risk

1. **Museum site:** The museum site at this time contains one historic structure, a preparation laboratory building, a barn and other associated out-buildings. The museum site houses all of the Park's museum collections. Adjacent to the museum site are farm houses with associated out-buildings. This site contains flashy fuels near the reservoir that could create a negative impact if a wildland fire occurred. As this site becomes more developed and visitors are allowed

to use constructed trails the risk of fire will increase.

2. **Monument:** The Monument site contains boardwalks, interpretive signing, fences, transportation signing, wooden power poles, an electrical substation and an irrigation pumping station. All of these improvements would be at risk during a fire event. The construction of trails through the Monument will increase the likelihood of wildland fire from human caused ignitions. Reestablishment of the green belts along roadways will reduce the size of fire starts in HAFO thereby lessening the risk of unwanted fire impacts. The Monument also contains fossils, which would only be impacted by fire if they were lying exposed to the heat of the flames, direct risk would be minimized if the fossils were still buried. There may be some cultural resource impacts on the Monument, especially at the south end, which contains segments of the Oregon Trail.

Table 1. Prevention Actions by Staffing Class for Hagerman Fossil Beds National Monument.

Staffing Class	Procedures
I	Regular fire season prevention signing will be posted prior to the start of fire season. Fire equipment and supplies ready for use. Wildland Fire Use message developed and incorporated into interpretive program.
II	Fire equipment and supplies maintained for use.
III	Fire prevention messages are developed for high wildland fire risk days. Fire prevention is incorporated into daily work assignments.
IV	All activities in Readiness Class III are continued. Cooperatives are contacted and activities coordinated (federal, state and county fire departments) in an effort to provide consistent information to the public and Monument neighbors. High Fire Danger notices will be posted in Visitor Centers and at site bulletin boards.
V	All activities in Readiness Class IV are continued. Restrictions and closures of Monument areas may be deemed necessary. Interpretive activities will include a fire safety message.

Appendix L

Craters of the Moon National Monument

LIMITED DELEGATION of AUTHORITY

Date:

To: _____, Incident Commander, _____ Fire

From: Superintendent, **Craters of the Moon National Monument**

Subject: Delegation of Authority for Fire Suppression

As Superintendent, I am responsible to protect the Park's resources and the lives of its visitors and employees. Your expertise in management of fires will assist me in fulfilling that responsibility during the present emergency situation.

By means of this memorandum I delegate to you the authority to carry out control of the fire or complex of fires named above in accordance with Department of Interior and Park Service policy and guidelines provided in the Agency Administrator's briefing and the wildland fire situation analysis. These documents will provide you with information on the current situation, management objectives and priorities, and constraints necessary to protect the Park's resources. You will find additional guidelines, concerns and constraints, if any, attached. A list of personnel assigned to assist you and of facilities available for use is attached.

Upon the arrival of the entire team, I will conduct an onsite briefing for you and your overhead organization. A fireline briefing will also be conducted for you and your staff by the local fire bosses.

Additional considerations follow.

1. Your first priority at all times is safety of firefighters and the public.
2. My Agency Advisor for you is _____, whose title is _____.
He/she has full authority to act for me in my absence.
3. My Resource Advisor for you is _____, whose title is _____.
4. Consistent with the suppression strategy, minimize environmental impacts. Use natural barriers and cold trail when possible. Avoid opening corridors along trails. Cut stumps to ground level, and remove trash from firelines daily. If not already addressed, specific needs for rehabilitation will be identified.
5. Emergency funds are available, but you should be prepared to make full explanation

and provide accountability for any and all expenditures.

6. Dozers and all-terrain or off-road vehicles shall not be used without specific authorization except for a threat to life and habitable or historic structures. Use of aircraft, power saws and pumps, and generators are authorized as needed.
7. Please try to minimize impacts on park visitors and neighbors.
8. I expect you to assume management of the fire by this time:
9. Office of Aircraft Services certified aircraft may be used within the constraints of Department of Interior policy.
10. All firelines will be rehabilitated, according to NPS policy and plans approved by my Resource Advisor.
11. Manage the fire with minimum disruption to visitor access and park operations, consistent with public safety. You may close areas if necessary for public safety by authority of 36 CFR. You must notify me prior to implementing any closure.
12. Environmentally compatible retardant use must be approved by my Resource Advisor.
13. Incident base, staging areas, helispots, and camp operations will be confined to:

.
14. Public information must be closely coordinated with the Unit Manager. The Unit Manager for this Incident is _____, whose telephone number is
.
15. Notify me of any threats to life or property as soon as possible.
16. Emergency suppression funding is available, and all requests for resources should be forwarded to the Columbia Cascades System Support Office Fire Management Officer, Ken Till at (206) 220-4257.
17. Provide training opportunities for park personnel when possible to strengthen our organizational capabilities.
18. A close-out fire analysis and evaluation will be conducted by me or my representative prior to the Incident team departure. I request a 24 hour advance notice of the meeting.

19. Key resource constraints are:

- a. .
- b. .
- c. .
- d. .

20. Cultural features requiring priority protection are:

- a. .
- b. .
- c. .
- d. .

21. A determination will be made as to the necessity of rehabilitation of burned areas. If it is determined that rehabilitation of burned areas is necessary then a Burned Areas Emergency Rehabilitation report will be prepared for both short and long term rehabilitation requirements. This report will be submitted within 24 hours of control of the fire.

Superintendent

Date

Incident Commander

Date

Appendix N.

Fuel Sampling Techniques

Data which served to characterize the plant communities at CRMO and which provide input into the fire behavior models were collected during the summer of 1987 and 1988. The vegetation map developed by Day and Wright (1985) was used to stratify vegetation sampling by plant community extent and spatial distribution within the monument. Only those communities which were thought to be capable of sustaining a fire were sampled.

A series of four 10 m transects were established at each sample point or macroplot (Fig. 1). The 4 transects originated from a common center and were oriented to the 4 cardinal directions. Five microplots (50x50cm) were located along each transect at 2, 4, 6, 8 and 10 m from the center. The following data were recorded for each microplot:

- 1) Total percent cover of annual forbs, perennial forbs, annual grasses, and perennial grasses
- 2) Estimated weight of standing herbaceous material
- 3) Actual field weight of herbaceous material
- 4) Actual air dry weight of herbaceous material
- 5) Estimated dry weight of litter

Down woody fuels were inventoried using the methods of Brown (1974) and Brown et al. (1982). In this method each transect can be visualized as a vertical plane from ground level to 2 m in height (Fig. 2). Along this plane the total number of intersections by diameter class (<0.65 cm, 0.65-2.5 cm, 2.5-7.5 cm, and >7.5 cm) of down, dead woody material were recorded. Total shrub canopy coverage for each species and non-fuel interspaces were recorded along each transect using the line transect method (Canfield 1941) (Fig. 3). In order to characterize fuel discontinuity, all areas not covered by aerial portions of plants or litter were classified as fuel interspaces.

Shrub height data are used in fuel load calculations. Shrub heights were measured at 3.3 m intervals along the transect. Height of the closest shrub was measured. Shrub heights were then averaged by species for each macroplot.

Shrub density was determined with four 2 m radius plots in each macroplot (Fig. 1). One was located at the outside end of each 10 m transect. Tree density was determined through the use of a 10 m radius plot using the 10 m transect as a basis for location. All densities were transformed to number of individuals per ha.

A species list was prepared for each macroplot. Species were recorded by their relative abundance. The following scale was used:

- 1) Abundant: Major component of plant community based on either high coverage or density
- 2) Frequent: Subdominant plant in the community based on coverage or density
- 3) Common: Plant evenly distributed throughout macroplot but of minor importance in community
- 4) Occasional: Only a few individuals on the site, but plants are evenly distributed throughout the macroplot
- 5) Rare: Only a few individuals on the site with patchy, uneven distribution pattern

Cross-sections and increment cores were taken from aspen, limber pine and Douglas-fir in order to age some individuals in selected stands. The increment core method (Barrett and Arno 1988) was used to date past fires in Little Cottonwood Canyon.

Wildland Fire Use; Go/No Go Decision Criteria

Cause/Source: Any wildland fires resulting from man-made ignitions or in Fire Management Unit 1 will be an automatic NO GO decision and require an appropriate management response. Wildland fires within Fire Management Units 2 or 3, resulting from natural ignition sources will be evaluated using the fire situation information gathered in the Stage I Wildland Fire Implementation Plan, Decision Criteria Checklist and by the criteria below to determine a GO or NO GO response in accordance with *Implementation Procedures and Reference Guide* (Wildland and Prescribed Fire Management Policy, 1998). A Go decision means the fire will be managed as a wildland use fire. Stage I of a Wildland Fire Implementation Plan is required for all wildland fires. Go decisions may only be made by the Superintendent (or others delegated with that specific authority in writing).

Small (<1 acre) spot fires surrounded by extensive natural fire barriers (Category I).

Location Criteria

Fire Management Unit 2 or 3

For fires in which the maximum area of spread is < 1 acre (natural fire barriers are 1.5X the maximum forecasted spotting distance); exceeding any of the following criteria will result in a NO GO decision.

Fire Behavior Criteria

Fire Danger Class (Adjective) Rating; Potter Butte or Arco NFDRS RAWs

Stations: Extreme

Burning Index (BI) > 100

KBDI \geq 600

Suppression or Monitoring Resource Availability Criteria

Eastern Great Basin Coordination Center Preparedness Level \geq V

Inability to obtain qualified Prescribed Fire Behavior Specialist/Analyst or Fire Use Monitors within 48 hours of fire report

Three or more Category I, two or more Category II and/or one or more Category III fires burning at the same time within the monument

Fires with moderate spread potential (1-100 acres) but surrounded by extensive natural fire barriers (Category II).

Location Criteria

Fire Management Unit 2 or 3

For fires in which the maximum area of spread is > 1 acre but < 100 acre (<10 acres for FMU 2) (natural fire barriers are 1.5X the maximum forecasted spotting distance); exceeding any of the following criteria will result in a NO GO decision

Fire Behavior Criteria

Fire Danger Class (Adjective) Rating (Potter Butte or Arco NFDRS RAWS Stations): Extreme

National Weather Service Red Flag Warning or Fire Weather Watch for Zone 409 or 410.

Burning Index (BI) > 80

KBDI \geq 500

Haines Index 6

Suppression or Monitoring Resource Availability Criteria

One or more Category I, two or more Category II and/or one or more Category III fires burning at the same time within the monument

National Preparedness Level \geq V

Eastern Great Basin Coordination Center Preparedness Level \geq IV

Inability to obtain qualified Prescribed Fire Behavior Specialist or Fire Use Monitors within 48 hours of fire report.

Fires with high potential for spread (>100 acres) (Category III)

Location Criteria

Fire Management Unit 3

For fires in which the estimated maximum area of spread is > 100; exceeding any of the following criteria will result in a NO GO decision,.

Fire Behavior Criteria

Fire Danger Class (Adjective) Rating (Potter Butte or Arco NFDRS RAWS Stations): \geq Very High

National Weather Service Red Flag Warning or Fire Weather Watch for Zone 409 or 410.

Burning Index (BI) > 60

KBDI \geq 400

Haines Index \geq 5

Suppression or Monitoring Resource Availability Criteria

One or more Category I, two or more Category II and/or one or more Category III fires burning at the same time within the monument

National Preparedness Level \geq IV

Eastern Great Basin Coordination Center Preparedness Level \geq III

Inability to obtain qualified Prescribed Fire Behavior Specialist or Fire Use Monitors within 48 hours of fire report